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Chemicals from the Wood Industry

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BATTELLE TECHNICAL REVIEW

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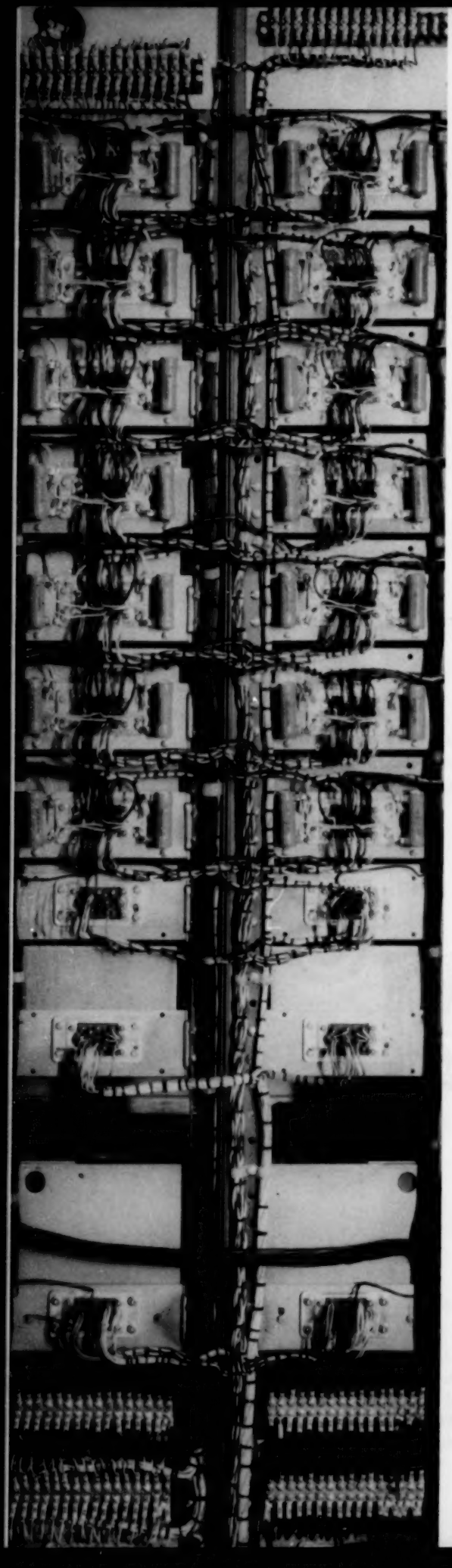

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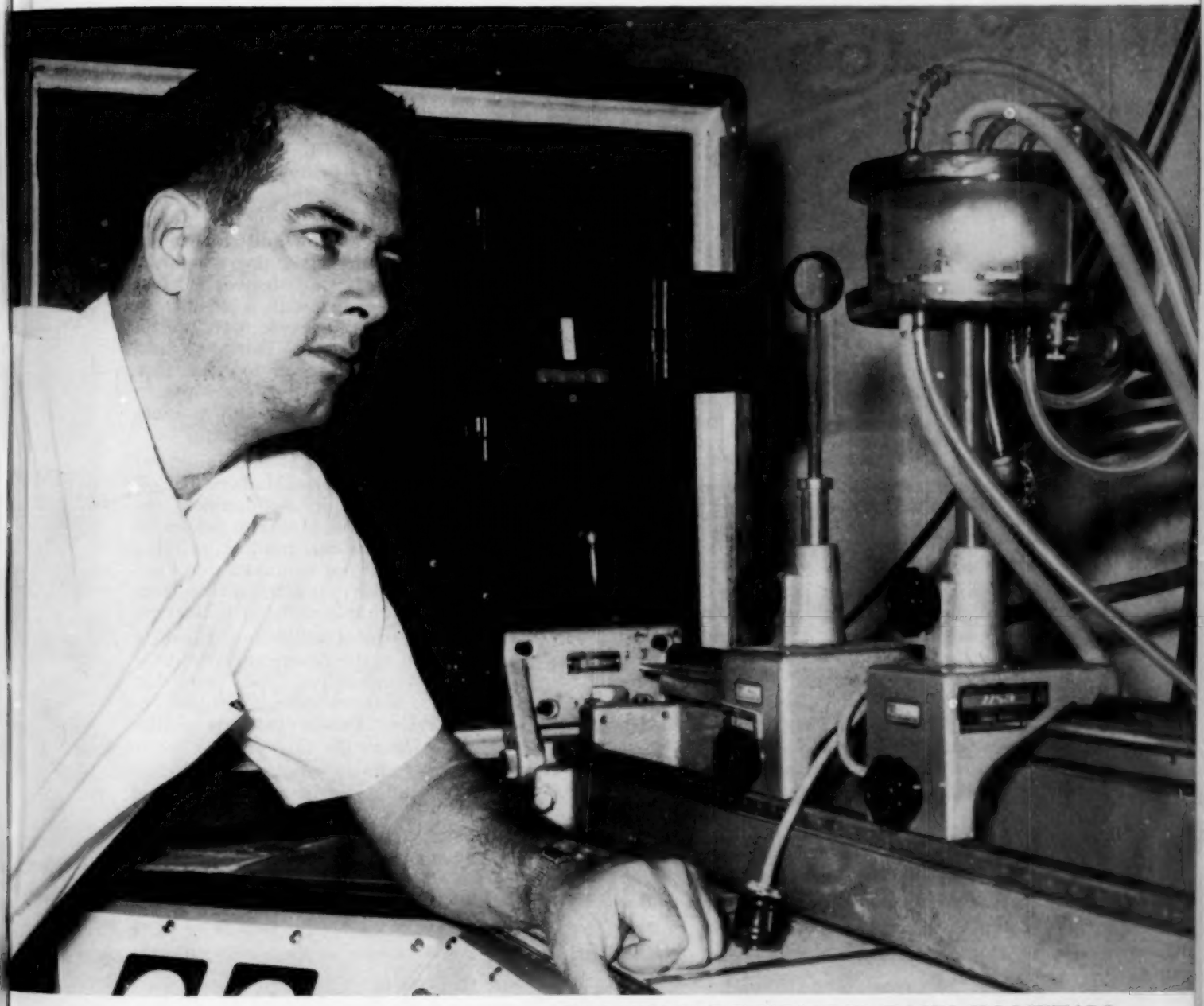
501a Battelle Technical Review Abstracts

Abstracts of articles and papers in a wide variety of technological fields from more than 1350 journals published throughout the world. Abstract selection largely reflects the primary areas of Battelle research.

The task of determining gases in metals is being lightened by the use of this equipment. The glass-enclosed excitation chamber differentiates the device from usual spectrographic equipment. It allows the exclusion of atmospheric gases and the introduction of argon which, in turn, excites gases that are released from the metal samples during the arcing process. Light from the incandescent specimens in the chamber passes through a lens, then through the door of the cabinet-like spectrograph, and registers photographically. The Battelle-built apparatus has proved useful for determining oxygen in titanium and is expected to aid in the determination of other gases in titanium as well as in other materials.



GAS HELPS DETERMINE GASES IN METALS

VIGNETTE

EXTRACTIVE METALLURGIST

OSCAR F. TANGEL

"Deal with the facts and only with the facts, and question everything" is the down-to-earth approach which has guided the professional activities of Oscar F. Tangel, who directs much of Battelle's research in the extraction and beneficiation of minerals and other materials. On the word of those who work with him, Oscar strives to take nothing for granted, but attacks every problem from virtually all possible angles. They say he is not satisfied until he has dug down to the basic elements involved.

When questioned about his major research interests, Oscar, in his characteristically bluff way, replies that he is interested in the beneficiation of any materials that can be improved by separation or concentration.

Oscar shares the interests of his colleagues, who have cooperated with him in developing techniques for processing practically all metallic ores and a variety of nonmetallic materials. A small, but typical, sampling of the research with which he and his colleagues have been associated includes high-temperature leaching processes; tin ore concentration; the concentration of uranium and niobium ore; and the extraction of nickel and cobalt. They have contributed to the beneficiation of iron ores, including ores from most of the North American deposits, as well as a number from other parts of the world. More recently, they have undertaken studies on the separation of such materials as seeds, wood chips, and bark, and industrial diamonds from abrasive sludge. Oscar believes that the methods used for the separation and concentration of minerals hold wide promise for solving similar problems in nonmineral fields.

Before joining Battelle in 1941, Oscar had served as assistant mill superintendent and metallurgical engineer with the Fresnillo Company in Mexico. He had also been associated with a number of mining companies in western and northwestern United States. During World War II he was assigned to the Office of the Chief of Ordnance, participating in research, development, and production of ammunition.

In addition to a B.S. in mining engineering received from Lafayette College and an M.S. in metallurgical engineering from the Montana School of Mines, his professional training included a year's study at the Bergakademie Freiburg in Germany, on a fellowship from the Institute of International Education.

His professional affiliations include membership in the American Institute of Mining, Metallurgical, and Petroleum Engineers; the American Chemical Society; and the Canadian Institute of Mining and Metallurgy.

Oscar admits to no great nonprofessional interests. However, he reports that his wife, Dorothy, and he are finding daughter, Joan, and sons, Bob and Dick, all teenagers, a pretty absorbing group.

A study of bark extractives engages the attention of the author. After research in the laboratory has revealed useful chemical products, the next step is often pilot-plant research to determine the feasibility of extraction on a commercial scale.

Chemicals from the Wood Industry

by SAMUEL A. WOODRUFF

The wood industry already supplies an array of raw materials to the makers of chemicals, and it is a promising source for numerous other chemical materials. However, the author points out that much research is required to make the best use of this rich treasure of raw materials.

WOOD, a renewable natural resource, has a bright future as a raw material for the chemical industry. The day is not too far distant when the whole tree will be torn from the ground, and the roots and all will be fed into the jaws of a giant chipper. The macerated pulp will still be used for the production of paper. But the residues, now used in only a limited way, will be utilized as a source of chemical products.

Over 100-million tons of wood residues are now available to the chemical industry each year. To avoid continued wastage of these residues, integration of the forest products industries is essential. This integration is rapidly becoming a reality. Sawmills have built pulp mills, which recover by-products from pulp residues. Pulp mills have put in chemical plants to recover extractives from bark and some species of wood. Conversely, pulp mills have built sawmills and veneer plants. Wood processing companies have built structural fiberboard and particle board plants. However, the full use of forest products by the chemical industry is far from being realized.

"Silvichemicals" (i.e. chemicals from wood) now on the market include vanillin, fatty acids, rosin, turpentine, dimethyl sulfide, ethanol, bioflavenoids, antioxidants, rubber reinforcers, plastic extenders, oil-well mud dispersants, emulsion stabilizers, ceramic binders, sugars, yeast, and lignin. Yet these are only suggestive of the rich prizes that await the chemical industry. The

slowness of the forest industry to build up the market for these different products is one reason for the tardy development of silvichemicals. However, pressures to exploit this chemical source are increasing rapidly since pollution control is imperative and expensive, and production costs are squeezing profits.

Chemically, wood is roughly made up of 50 per cent cellulose in the form of fibers, 20 to 30 per cent lignin, which serves to cement the fibers, hemicellulose (20 per cent), and extractives (1 to 10 per cent). The pulping process used in the paper industry is essentially the separation of the cellulose fibers from the lignin and other materials which bind them.

The most profitable use of wood by a chemical process to date is the conversion of the cellulose to pulp. The pulping industry ranks fifth among the nation's top industries. U. S. production last year rose to about 31.3 million tons valued at 11 billion dollars. About 170 different types of pulp products are made, and this nation has reached the highest per capita consumption of paper and paper board in the world—432 pounds annually for each individual.

Lignin

Lignin, one of the potentially important materials in wood, is a source for hundreds of products and can rival coal and petroleum as a source of synthetic chemicals. Yet kraft and soda pulp mills in the United States annually use two to three million tons of lignin as fuel. In addition, millions of tons of spent sulfite liquor lignin from pulping mills are wasted. The development of methods for converting this material into pure organic chemicals of low molecular weight offers a great challenge to chemists.

Some steps are already being taken to utilize this material. Thus, several mills are isolating and marketing both softwood and hardwood alkali lignin in commercial quantities. Four mills also produce vanillin from spent sulfite liquor at the rate of about 1.4 million pounds annually. Unfortunately, requirements for flavoring vanillin are so limited that they absorb less than one per cent of the available spent liquor. However, the Institute of Paper Chemistry is carrying on a fundamental research program through which vanillin has been converted into hundreds of related compounds. A large number of these products have been evaluated for several end uses, many of which should eventually find markets.

In addition to vanillin and vanillic acid, other organic chemicals which can be prepared from spent sulfite liquor lignin are guaiacol, acetovanillon, syringaldehyde, syringic acid, 5-carboxyvanillin, 5-carboxyvanillic acid, esters of vanillic acid, vanillil, and many other guaiacyl and syringyl compounds.

In spite of 80 years of research effort, the fundamental chemistry of lignin is still not completely known. We do know that its main building block is a substituted phenylpropane. An important reason for the failure to identify the structure of lignin appears to be the fact that each method for its removal from wood produces a modified lignin, unlike its natural form in the wood.

Lignin is a potential source of aromatic chemicals. Two newer methods of processing the material to provide aromatics have been reported. One is controlled pyrolysis which gives aromatics in the tars with an activated char as the residual product. The second, catalytic hydrogenolysis, gives phenols, cyclohexanols, and substituted cyclohexanols.

The most promising market for lignin, if the proper modification can be found, is in rubber, plastics, and other molding compounds. Other possible markets are for materials for use in the tanning industry and in highway construction.

Hemicellulose

In the kraft process, the easily hydrolyzable hemicellulose has been converted to saccharinic acids which are suitable as an intermediate for the production of deoxyribose and nucleic acids—so valuable in diet supplements. The sulfite pulping process converts the hemicellulose material to free sugars, about 400 pounds for each ton of pulp produced. Two plants are converting these sugars to *Torula* yeasts, which are being used in animal feedstuffs and as food supplements for both man and animal. Another plant is fermenting the hexose sugars to industrial alcohol.

Dr. Woodruff's broad experience in research on wood products and by-products is reflected in this article. He has participated in studies in the utilization of bark, the identification and utilization of pulp-mill waste liquors, the polymerization of cellulose, corrugated strawboard, and various aspects of the pulping process. He has been associated also with studies on catalytic reactions in the petroleum field, preparation of high-purity aluminum, titanium, and zirconium, elimination of explosive atmospheres, and causes for corrosion in paper-pulping processes. In addition to his Battelle experiments, the author has been associated with research at the Forest Products Laboratory and in the laboratories of the American Rayon Corporation, the Kimberley-Clark Corporation, and the Research Foundation of The Ohio State University.

The major chemical derived by acid conversion of the pentose fraction is furfural, which in turn is converted to nylon intermediates. Pentose sugars, according to the Forest Products Laboratory, are likely to be important in the chemical industry. Similarly, the hexose sugars have a bright future. The continued acid decomposition of hexose sugars to hydroxymethyl furfural and then to levulinic and formic acids are commercially interesting organic compounds for the synthetic fiber and polymeric fields. The hexose sugars can be hydrogenated to polyols, sorbitol, propylene and ethylene glycols, erythritol, and glycerine. The pentose and hexose sugars undergo many types of fermentation including alcohol, lactic acid, acetic acid, butanol, and acetone.

Wood chips, sawdust, and wastes may be hydrolyzed to produce levulinic acid. From various reactions, many commercially important derivatives have been formed from levulinic acid, including vinyl levulinate, a water soluble cellulose levulinate acetate, dimethylpyrrolidone, and basic aluminum levulinate.

Tall Oil

In the kraft pulping of resinous woods, the resins in the wood are both saponified and dissolved in the alkaline cooking medium. These soluble resins stay in the alkaline medium, and remain in the black liquor as sodium soaps. On concentration and cooling, these soaps separate as skimmings which are removed and acidified to give "tall" (Swedish for "pine") oil. Tall oil is a mixture of about 35 to 50 per cent resin acids, 40 to 60 per cent fatty acid, and 5 to 7 per cent neutral compounds. With the supply of much-needed fats and oils shut off during World War II, the separation of substitute fats and oils from tall oil became an economic necessity. At the end of the war, many kraft mills were collecting their skimmings and making them available to the chemical industry. Today tall oil has reached the status of an important chemical raw material, especially for coatings, detergents, and resins.

Although tall oil was originally available only as a crude, dark, molasses-like material, today most of the production is being refined. Acid refining still continues to be an important process but most tall oil today is refined by distillation. Modern distillation processes yield rosin products similar to gum and wood rosin and very fine fatty acid fractions containing mostly oleic and linoleic acids with only very small amounts of rosin acids and unsaponifiable matters. These new rosin and fatty acids are finding increasing use as major chemical raw materials in contrast to the use of tall oil as a cheap substitute a few years ago. Tall oil now ranks third in order of oils consumed by the paint and varnish industry.

The neutral or unsaponifiable portion of tall oil contains various sterols, generally classified as phytosterols. Beta-phytosterol, which may be recovered from tall oil pitch, is now being used for treatment of aetherosclerosis. Other possible medicinal uses of these steroidal materials are also being sought.

Condensation of the digester relief gases from the kraft pulping of pine woods yields sulfate turpentine in amounts up to 22 pounds per ton of pulp; total annual production is estimated at 19 million gallons. Today, sulfate turpentine makes up a high percentage of our total turpentine production. Thus, the kraft pulping industry has in its tall oil and sulfate turpentine the raw materials for a by-product resin and terpene chemical industry similar to that of the wood naval stores industry.

Based on increasing kraft pulp capacity, the national whole tall oil potential may reach over one-and-a-half billion pounds in 1975. Major uses for whole and refined tall oil include asphalt additives, compounders, core oils, degreasing compounds, driers, flotation agents, linoleum, oil cloth, hardfloor coverings, lubricants and greases, oil well chemicals, rubber, soaps and detergents, sulfonating agents, surface coatings, and printing inks.

Extractives

The bark at the pulp mill is the major source for extractives, since most of the extractives in a tree are located in the bark. For example, about three-fourths of lodgepole-pine bark and redwood bark is soluble in dilute alkali. Between two and twenty per cent of the wood substance itself (depending on species) consists of extractives soluble in neutral solvents. These extractives, of course, have been the basis for the naval stores industry. Old-growth longleaf and slash-pine stumps are getting to be in short supply, which makes this industry increasingly dependent upon the tall oil recovered from kraft liquors.

Extractives in wood and bark include water-soluble products, such as carbohydrates, organic acid, tannins, and dyes, as well as fats, oils, waxes, resins, terpenes, and essential oils. Three companies now have sizable operations in which an oil-well drilling-mud additive is manufactured. Dihydroquercetin and quercetin, useful as antioxidants, are nearing commercial production by an extraction process of Douglas fir bark. A promising bioflavenoid, myricetin, is being recovered from lodgepole-pine bark and may find a market in cold remedies.

Commercial chemicals by the carload lots are being manufactured from redwood bark in an enlarged plant at Scotia, California. The dust and fine debris of the redwood bark are chemically converted into products which command a large market outlet. Two different cooking processes are used in a continuous digester to make industrial chemicals based on the phenolic constituents of the bark. (With either a sodium hydroxide cook or a sodium sulfite cook, chemical products are made as the sodium salt of the phenolic materials which are present in the redwood bark. Yields of 60 to 80 per cent are obtained.) The pressed-out cooking liquor is drum-dried and conveyed to the bagging operation. Commercial uses of these chemicals include dispersing agents, phenol replacements, tannin replacements, ceramic binders, ore flotation agents, battery expanders, boiler-water treatment materials, and oil-well drilling-mud conditioners.

Other By-Products

A commercial process is now in operation on the West Coast to produce dimethyl sulfide from kraft waste liquor. A search is in progress for uses for the material and its derivatives.

Spruce turpentine, the condensate from the relief gases given off during the sulfite digestion of coniferous woods, is essentially p-cymene with small amounts of dipentene, borneol, and sesquiterpenes. P-cymene has been converted on a commercial scale to such aromatic compounds as cumic acid, dimethyltotylcarbinol, methylacetophenone, phenol, and methylstyrene. Uses for these are also being sought.

Another by-product of the sulfite pulping industry in conidendrin, recovered mostly from the western hemlock waste liquors. At present a pilot-plant operation of one mill is supplying enough conidendrin for market studies. Demethylation of conidendrin yields a very potent antioxidant for fats, oils, and other materials.

This brief account only suggests the wealth of chemical materials available as by-products from the wood industry. However, the intensification of research on the problems of utilizing these materials would greatly increase the number of chemicals that could be produced. Such an effort is worthwhile from a purely economic point of view. Two great industries would be certain to gain from any research discoveries—the forest products and chemical industries. But a successful solution to these problems would also contribute to the welfare of the entire nation by opening up a renewable supply of raw materials that will benefit future generations.

Planning a Product-Development Program

Successfully preparing a product for the market calls for a sound product development program. The author reviews and discusses the factors that must be given consideration to assure the most effective programs possible.

by ALBERT M. ROCKWOOD

ONE OF THE most interesting facets of the dynamic story of American industry is product development—the process whereby new goods are created. We are almost overwhelmed by a profusion of necessities, luxuries, novelties, and gadgets as companies compete freely for our income. In exploiting all kinds of technological advancements, each company is striving toward a goal—a product at a price that will satisfy or create a profitable demand.

The opportunity for the development and sale of new products is ever present and seemingly unlimited, and it multiplies itself in wonderful and unbelievable ways. Automobile production stimulates travel, and, presto, a need exists for motels, camping equipment, portable TV sets, and car seats for babies. A technological advance in plastics makes possible the squeeze bottle—catsup dispensers, hand lotion dispensers, and atomizers. Transistors make possible a whole new family of small electronic gadgets. As a result, new businesses spring up, old ones are rejuvenated, and a beneficial spiral is the result.

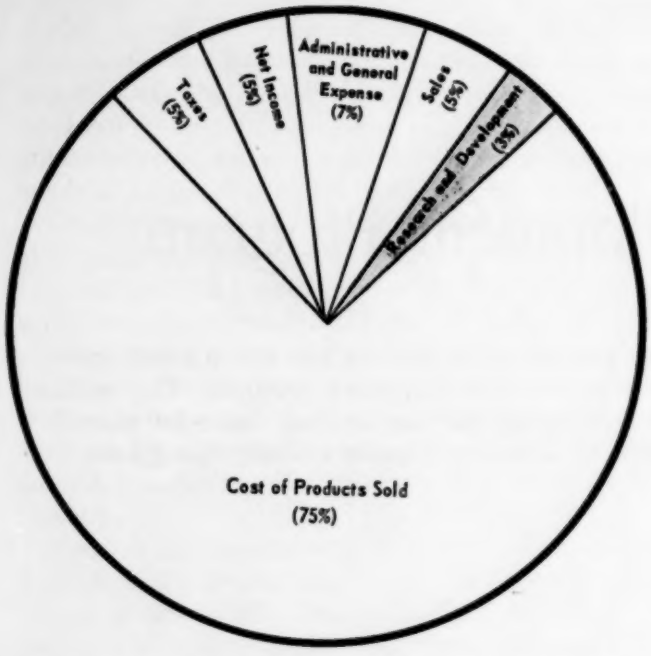
The successful creation, manufacture, and sale of new products may sound easy, but it is not. We are told that only one of ten new products which reach the market survives to make a profit for its company. The nine products that do not survive fall victim to high price, lack of demand, poor distribution, poor quality, poor timing, or lack of reliability—most of which can be blamed either on a poor analysis of the market or on an inadequate program of product development.

Market analysis and product development are almost inseparable, and the importance of a good market survey cannot be overestimated. A good market survey enables the manufacturer to lay out a complete set of specifications for his proposed product—its size, its life, its weight, its function, and its cost. In short, the survey tells him what his prospective customers will demand, and it also guides him in establishing the quantity of his product that might be sold for a given price.

PLANNING THE PROGRAM

Armed with this information, the manufacturer can plan a realistic development program. Usually, he will take a look at the economic risk involved. He has an estimate of his sales potential, and this he knows must cover certain costs that are more or less fixed. The costs depend, of course, on the times, the product, and the characteristics of the company. A typical breakdown might be similar to the one shown on page 8. The manufacturer can estimate sales effort, overhead, and manufacturing costs—the latter based on the selling price. He can estimate taxes based on estimated income. The rest of the potential can be devoted to the cost of product development. Hence, if the market survey indicates a potential net sale of $25,000,000, the wise businessman should not plan to spend more than $750,000 on product development, and even this amount must be balanced against the probability of success.

Even the most careful calculation is only an approximation. Therefore, careful executive judgment is cru-



Typical distribution of net sales of a new product distribution.

cial in making the final decision. Nevertheless, the process of risk calculation should be undertaken, even on an intuitive basis, to evaluate and limit the scope of the development program that will be required to give birth to the new product.

As the program proceeds, the executive must be ruthless, too, and insist on proof of satisfactory progress toward the objective. If progress ceases, the program should be reviewed critically and stopped, if necessary, so that its funds can be diverted to more profitable channels.

Those concerned with the management of product development require a standard of comparison and guideposts along the way. Fortunately, most product development programs can be fitted into a general pattern and will, if progressing satisfactorily, match up at readily predictable points. This pattern can be expressed in terms of cost, time, and accomplishments. Sometimes it can be projected to the point at which the product should be ready for production. In other cases, it can only be projected a step or two. Factors affecting this projection include complexity of the product, relative state of the art, experience with similar problems, number of alternatives that can be foreseen, life expectancy of the product, and severity of cost limitations.

A Product Development Program

A typical product might be evolved through the program breakdown presented on the opposite page. Although all the phases shown may not be required, and the overlap of certain phases may shorten overall development time, each phase should be carefully considered. Activities relating to the Idea phase are particularly important because that phase forms the foundation for the entire product-development program.

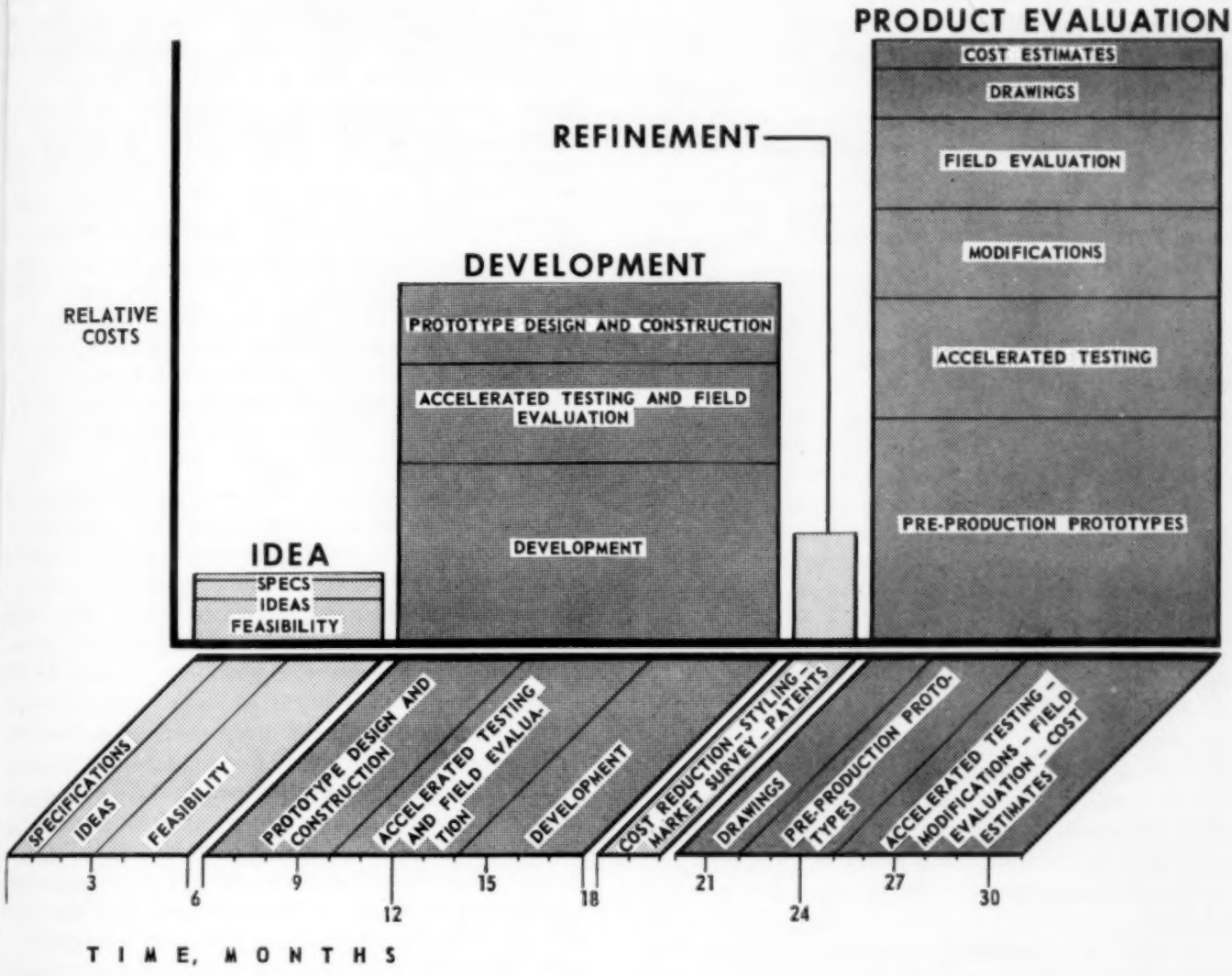
Idea Phase

The product development program should start with the establishment of complete, realistic, and compatible specifications for the new product. The trends indicated by market research should be carefully evaluated. Production requirements, servicing, and sales features should all be given due consideration. The better balanced the management team which shoulders the responsibility for establishing development of objectives, the better the chances for eventual success.

Once the objectives have been agreed upon, the research and development team should collect and evaluate the past experience of the company, of competitors, and of others confronted with similar problems. Literature searches, including patent searches, may often prove helpful. Most important of all, however, is a creative, inventive team limited as little as possible by tradition or convention. The tougher the problem the greater freedom the research group needs to accomplish its tasks. Problems have to be worried and explored, pushed and pulled by keen minds and, in most cases, the more minds the better. No matter what the problem, however, the establishment of a time limit is desirable. Men generally work better under pressure, and the creative mind welcomes it.

Albert Rockwood's broad experience in the field of product development has given him a deep insight into the types of research activity that are likely to assure successful end products. At Battelle, he has participated in, and directed, studies in such fields as variable-speed drives, aircraft components, automotive parts, household appliances, construction equipment, vending devices, and production aids for industry. Recently, he guided the development of a tea maker, now being introduced into restaurants. These developments have led to more than a half-dozen patents. The author began his professional career as a design engineer with the Curtiss-Wright Corporation.

A TYPICAL PRODUCT DEVELOPMENT PROGRAM



Usually, if ideas are to be generated at all, they will come quickly under pressure, and the point of diminishing return can be reached rather rapidly.

If ideas don't seem to flow on demand, lack of practice is often to blame. Creativity, although stronger in some people than others, can be developed by exercise. Thus, a company whose need for new products is continuous may have more success in generating them than one with an occasional need. Creativity is stimulated by diverse experience and can be stifled by specialization. Channeled thought can often block the emergence of good ideas, and many companies have found that the exposure of fresh minds to an old problem will produce results when more experienced people have confessed defeat.

At the end of a specified period, all ideas should be collected and reviewed. Usually several ideas will prove to be worthy of further study. Although one good idea may be sufficient, ultimate success is enhanced by the existence of good alternatives. Furthermore, while short-range needs may best be served by the idea which requires the least development effort, another that requires more development might lead to a less expensive product or to a patentable one. On the other hand, the pursuit of too many ideas may dilute efforts to ineffectiveness or raise the cost of the development program beyond desirable limits. Good research management asserts itself at this point and may solve the dilemma with a feasibility study that will prove the merits of proposed ideas and lay bare most of the problems which must be overcome if eventual success is to be achieved.

Development Phase

The selection of the product and the feasibility study clears the way for the design and construction of a working model or prototype. If the feasibility study has been thorough, the designers will be in a position to provide for evaluation of alternate ideas, suitable instrumentation, and flexibility. Flexibility is a must even if compactness, cost, or some other desirable feature has to be sacrificed at this time. The important thing is to create a three dimensional embodiment of the basic principles which, under tests, will provide the information required for fruitful development work.

Thoroughness in the evaluation of the prototype is essential, because while it is not too difficult to find out if a product will work, it is another matter to find out how long it will work or how it will work under field conditions. The research team confronts a paradox at this stage. Its task is to select severe test conditions and, at the same time, protect the prototype from premature failure that might discourage development of a product that has real promise. Because time is so important, accelerated tests are usually used. However, such an evaluation cannot be considered as complete because it leaves out the effects of such important factors as age, shutdown time, or environment. Sometimes an accelerated test will impose conditions which are unrealistic and create false development problems. As a check on this aspect, the addition to the research program of an evaluation in the field will provide partial confirmation of accelerated test results. Of even greater significance are the additional shortcomings that actual environment and use by average people — the eventual buyer — will reveal.

By now the obstacles to success should be obvious, perhaps painfully so, and the scope of the development program can be established. This phase of product development is seldom sufficiently anticipated. Optimistic inventors are always positive that their original ideas will materialize without a hitch, and management, anxious to capture next year's market, is overly eager to accept the elimination of a development period from the product development schedule. It is admitedly difficult to forecast the nature and scope of this phase of the program. Nevertheless, experience would seem to indicate that the development phase may require as much time and effort as has been spent on the entire program to date. This period is a trying one, because unforeseen problems and delays are characteristic. It is the time when alternate ideas may assume real importance, a time when resourcefulness and experience are needed, and a time when many patentable ideas may be evolved.

Management has a right to expect frequent appraisals during this period because the program should be closed if results are not promising. Rate of progress in terms of problems solved is an important indication of probable success. This is also true of design complexity. Usually a good product design will become simpler as it is evolved. Functions can be combined, controls eliminated, or safeguards simplified. If, on the other hand, the design tends to become more complex, then the basic principles ought to be rescanned critically.

Completing the Program

Once the development phase has been successfully completed, the finishing touches can be added. It is then time for styling, cost reduction, market survey, and patent work, as well as for consideration of changes indicated in the product.

At this point, management's decision to continue is of special importance, because from here on development costs rise sharply. Engineering objectives should now include evaluation of production techniques and their effect on product performance. Partial tooling may be called for and good engineering drawings are required. Material selection should be finalized and many intricate details must be worked out and evaluated. Both field and laboratory evaluations have to be expanded to provide statistical data on product performance. Time can be bought with duplicate equipment and parallel programs at some sacrifice in efficiency. However, scheduling becomes easier as the work becomes more routine and projected goals become more realistic as development problems are solved or design choices are justified. Nevertheless, management should resist the temptation to commit funds for extensive production tooling until every serious doubt about product performance, cost, and marketability has been removed.

Thus it can be seen that company management has a heavy responsibility in all phases of product development—the creation of ideas, the development of a prototype, the refinement of the product, and the final evaluation that precedes commitment to production. Because of costs, each step requires close surveillance to assure the greatest possible return, both from ideas and from their elaboration. While suggestions such as those presented here can help to highlight points that are critical, the burden of successfully carrying through a program and making the final decisions must rest upon the responsible executives.

NOTES from BATTELLE

METEORITES FOR MISSILES

Nature's own space missiles hold secrets that can aid in the development of modern-day missiles. For this reason, meteorites, which are nature's primitive missiles, are currently under examination by technologists.

Metallurgists, crystallographers, and other scientists hope to learn more about what happened to these chunks of metal when they first fell into the earth's atmosphere from outer space.

Tomorrow's missiles, it is generally agreed, must be able to withstand severe heating when they re-enter the earth's atmosphere. At that time, the temperature of the missile's skin might be heated to as much as several thousand degrees Fahrenheit within a few seconds. Meteorites have been penetrating the earth's atmosphere for ages and each one has undergone the rapid type of heating that would be encountered by a missile.

Battelle technologists, Charles R. Simcoe and George K. Manning, who, with their colleagues, are conducting the research for the Air Research and Development Command, believe that by studying the metal structure of samples taken from the surface of meteorites they will be able to learn more about the nature of this heating and its effects on metals. This knowledge, in turn, may contribute to the building of better missiles.

In particular, the technologists will examine samples from different locations in the same meteorite, with the expectation that microscopic inspection will reveal variations in the crystals of iron and nickel that make up the bulk of the meteorite. These crystal-structure variations, which will indicate the pattern of heating that took place when the meteorite plunged through our atmosphere, may possibly lead to knowledge of how to make better alloys for use at high temperatures.

Obtaining samples of metallic meteorites is one of the problems that now face technologists at Battelle in this research program, which is being monitored by ARDC's Wright Air Development Center, Dayton, Ohio. Battelle scientists hope to obtain specimens from museums and private collectors. "Naturally, we would appreciate offers of specimens or information about where they might be obtained," says George Manning, the metallurgist in charge of the project.

CHANGING FUEL PICTURE

The rapidly changing industrial picture in the United States naturally affects the usage of fuels. In order to get the clearest possible picture of future fuel demands, frequent studies of probable future trends are needed, based upon the most recent practices and developments. Such a study was presented before the Annual Meeting of the American Marketing Association in a report by Howard R. Batchelder and Harlan W. Nelson of Battelle.

Their report was basically a revision of an earlier study made in 1955. The following changes in the picture to 1975 were indicated by the new figures that have become available since the earlier study. Recent estimates of per capita consumption of energy in 1975 required adjustment upward from 272 million to 280 million Btu because of the increased demand since the previous study. The total energy demand for 1975 was forecast as 63,000 as against 57,000 trillion Btu only two years ago, partly because of higher estimates of population for 1975.

The greatest change for the future was found to be in the natural gas picture. A recent estimate by the Bureau of Mines placed ultimate reserves of natural gas at 1000 trillion cubic feet—twice the previous estimate which had been used by the authors for their 1955 study. On the basis of the new figure on ultimate reserves, Batchelder and Nelson believe that there will be enough gas to meet all 1975 needs. They also suggest that the necessity for using synthetic gas may be put off until near the end of the century.

COMPONENT SPECIFICATIONS

Reliability engineering research studies to supply criteria for selecting and establishing realistic specifications for electronic components have been started for the U. S. Army Signal Equipment Support Agency, Fort Monmouth, New Jersey, in the Battelle laboratories.

Kenneth E. Cochran, who directs Battelle's reliability engineering research division, outlines the provisions of the 12-month $300,000 contract as follows:

1. To establish testing procedures and requirements for the preparation of military specifications

for electronic parts and materials for which no specifications exist.

2. To establish limitations based on the state-of-the-art for the application of electronic component parts and materials covered by existing specifications and to indicate areas for additional research and development.

3. To prepare detailed specifications for those electronic components and materials covered by omnibus-type military specifications.

Specifications written by the Signal Corps as a result of this study will be used for procurement and standardization of electronic component parts and materials to be used in military electronic equipment. In addition, data from this research may be useful as a guide in the application of these components.

* VACUUM TECHNOLOGY FUTURE

"Vacuum metallurgy is only now beginning to receive widespread acceptance as a generally useful tool," stated Ivor E. Campbell of Battelle in a lecture at New York University recently. "In the past, vacuum operation was regarded as inherently too expensive for most applications and one to be avoided. Even today, the possibility of economics by vacuum processing is frequently dismissed peremptorily without an actual evaluation of the relative costs.

"However, the advent of vacuum-melted steels is causing a reappraisal of the potential of vacuum processing elsewhere in the metallurgical industry."

The Institute technologist pointed out: "In an increasing number of cases, it is to be expected that cost analyses will show a real economic advantage to vacuum processing. In many cases, a vacuum is not only the best, but also the least expensive 'atmosphere' that can be employed.

"Perhaps the most important area for further expansion of vacuum metallurgy is in the processing of high-purity metals, or in alloy processing where quality control is particularly important . . .

"To date, vacuum technology has been most widely used in melting and sintering and similar operations involving primarily only physical changes. As has already been indicated, such applications can be expected to expand rapidly. However," Campbell added, "chemical-metallurgical processing at reduced pressures can also be expected to assume increasing importance in the future. Vacuum-arc reactions and reactions in glow discharges have been investigated only superficially to date, but should find extensive use in the future."

* ANALYSIS OF HIGH-PURITY IRON

As a result of the establishment of a "bank" of high-purity iron at Battelle under the sponsorship of the American Iron and Steel Institute, the development of adequate analytical methods was required to evaluate the impurities remaining in the purified metal. Improved techniques were devised for obtaining complete analyses.

Battelle technologists Richard E. Heffelfinger, Dan L. Chase, George W. Rengstorff, and William M. Henry participated in the working out of the evaluation problem. Briefly the techniques used are as follows: separation of metallic impurities is achieved by ether extraction of a hydrochloric acid solution of the iron. The amounts of manganese, copper, nickel, chromium, vanadium, cobalt, aluminum, lead, titanium, tungsten, and zirconium present is determined by spectrographic analysis of the aqueous phase. Sulfide precipitation and subsequent spectrographic analysis is used for elements in the sulfide group. Direct arcing of ferric chloride is utilized for silicon, magnesium, and calcium. Boron is determined by standard spectrographic methods; carbon by a combustion method; and sulfur and phosphorous spectrophotometrically. Vacuum-fusion analysis is employed for oxygen, hydrogen, and nitrogen.

The detection limits by these methods range from 0.1 to 10 ppm.

The special high-purity iron program, which makes the "bank" possible, is now entering its ninth year at Battelle through the continuous support of AISI. Dr. Rengstorff, who oversees the program, reports that a supply of one-pound ingots of zone-purified iron will be maintained for distribution to research technologists at the direction of AISI.

* Where niobium and niobium alloys are considered for use in nuclear and other applications, a means of determining oxygen and hydrogen contents are needed. While hydrogen proved to be no problem, no known methods, until now, were suitable for the determination of oxygen.

W. R. Hansen and M. W. Mallett, of Battelle, report that a diffusion-extraction method for oxygen has been developed at the Institute which provides reproducible and accurate results. Mean deviation of the results at the 0.019 weight per cent oxygen level is less than 0.001 weight per cent. The method is based upon earlier studies which showed that oxygen can be extracted from niobium at 2000 C in a vacuum.

Writings by STAFF Members

Chromium. Metallurgy of Chromium and Its Alloys. Reinhold Publishing Corporation, 1956, contains the following papers by staff members:

Chromium in Cobalt-Base Alloys. Howard Cross. pp. 304-309.

Appreciable amounts of Cr in the alloys contribute to the formability, ductility, hardness and corrosion resistance at both room and elevated temperatures, oxidation resistance, and strength at elevated temperatures.

Chromium in Titanium-Base Alloys. Murray C. Udy. pp. 319-323.

Describes melting, forging, rolling, cold working, heat treatment, and properties of Cr-Ti alloys. Their outstanding property is high room-temperature strength in combination with low specific gravity.

The Physical and Chemical Properties of Chromium. Murray C. Udy. pp. 101-147.

Chemical properties, phase diagrams, and selected values of known physical constants of chromium and its compounds of a metallic nature are reported.

Corrosion of Stainless Steels in Supercritical Water. W. K. Boyd and H. A. Pray. *Corrosion*, v. 13, June 1957, pp. 375t-384t.

The behavior of stainless steels, including both hardenable and nonhardenable grades, in degassed supercritical water at 800, 1000, and 1350 F and a pressure of 5000 psi is described. In general, the corrosion at 1350 F observed for the alloys was found to be intergranular, while at 1000 F, only Inconel X exhibited selective penetration along grain boundaries. All alloys suffered some decarburization and carbide precipitation after exposure to supercritical water at 1350 F. No significant phase changes were observed at 800 to 1000 F. The Armco-17-4PH, Armco 17-7PH, and Hastelloy F alloys were the most resistant materials at 1350 and 1000 F. All of the alloys evaluated had excellent resistance to 800 F degrassed supercritical water. The AISI type 316 material was shown to be susceptible to stress-corrosion cracking at 1350 F.

High-Temperature Properties of Molybdenum-Rich Alloy Compositions Made By Powder Metallurgy Methods. W. L. Bruckart and R. I. Jaffee. Paper from *Symposium on Metallic Materials for Service at Temperatures Above 1600 F.* American Society for Testing Materials. 1956. pp. 111-134.

Members of the Battelle staff are authors of the recently published articles and books listed on this page. In most cases, reprints are available from the Battelle Publications Office, 505 King Avenue, Columbus 1, Ohio.

The effects of metallic and oxide additions on creep-rupture properties and on resistance to recrystallization were studied. Nonmetallic dispersions provided greater increases in rupture time than solid solution additions. Outstanding among the nonmetallics were ZrO_2 and TiO_2. Silicon was the outstanding metallic alloying addition. At 1800 F, some of the oxide additions increased the rupture strength of Mo almost fourfold.

Titanium Alloys. Robert I. Jaffee. *Metal Progress*, v. 71, June 1957, pp. 101-103.

Characteristics of presently available alloys for aircraft use at high temperatures are summarized along with future possibilities. Present indications are for an alloy for use at a top temperature of 1000 F. A Ti-base material suitable for service at 1200 F is doubtful.

Reaction of Zirconium with Water Vapor at Subatmospheric Pressures. M. W. Mallett, W. M. Albrecht, and R. E. Bennett. *Electrochemical Society, Journal*, v. 104, June 1957, pp. 349-352.

In the temperature range 300 to 600 C the reaction of Zr with water vapor at 33 mm. Hg pressure follows the cubic rate law with an activation energy of 29,700 cal. per mole. The mechanism of film formation is the same as that for the Zr-O reaction.

Titanium Extrusions. A. M. Sabroff and P. D. Frost. *Modern Metals*, v. 13, June 1957, p. 50 + 4 pages.

A summary of available information on extrusion of Ti and its alloys including probable demand and requirements and progress in meeting it, firms that have extruded titanium, extrusion practices, tooling, heat treating, and mechanical properties of extrusions.

A New Method For Studying Riser Requirements of Castings. John Varga, Jr. *Foundry*, July 1957, pp. 106-109.

Plotting test data on log-log co-ordinates, and selecting suitable parameters for the co-ordinates, produces a straight line which simplifies determination of sizes of risers required for a wide variety of simple casting shapes and sizes.

Ductility of Tungsten-Arc Welds on Molybdenum. N. E. Weare, R. E. Monroe, and D. C. Martin. *Welding Journal*, v. 36, June 1957, pp. 291s-300s.

Good bend ductility at 25 and 75 C was found for welds made using the best procedures established for dry-box and conventional welding. A standard shielding cup and a leading-trailing shield unit produced the best welds made in air to date. A significant difference in bend ductility was found between welds made in different heats of arc-cast carbon-deoxidized Mo of about the same carbon content.

Methodology in Air-Pollution. J. E. Yocom. Purdue University, Engineering Extension Department, *Extension Series No.* 91, 1956, pp. 570-583.

This condensation of a detailed guide used for setting up air-pollution projects at Battelle describes the setting up of a large-scale area air-pollution study which involves a diverse industrial area and a nearby residential community.

WORLD-WIDE ABSTRACTS

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***Asterisks mark items that may be used in the Battelle Library only. None of the unbound materials listed below are available for interlibrary loan.**

AERONAUTICAL ENGINEERING

12475 Rigidity as a Factor in Rate Gyro Mounting. Henry A. Dinter, Jr. *Aeronautical Engineering Review*, v. 16, July 1957, p. 52 + 3 p.

Two figures of merit are developed which justify establishing a minimum spring rate for the gyroscope structure and its mounting bracket.

12476 Optical Methods for Examining the Flow in High-Speed Wing Tunnels. I. Schlieren Methods. D. W. Holder and R. J. North. **II. Interferometer Methods.** George P. Wood. *AGARDograph*, no. 23, Nov. 1956, 148 p. (TL565 Ag11g Contin.)

Reviews the present state of knowledge concerning the use of schlieren, direct-shadow and interferometer techniques for visualizing and photographing flow conditions.

12477* Stability and Control Problems Associated With Supersonic Aircraft. O. E. Michaelsen. *Canadian Aeronautical Journal*, v. 3, June 1957, p. 178-184.

12478* A Canadian Look at VTOL Transport Aircraft. I-II. E. E. McCullough and P. J. Pocock. *Canadian Aeronautical Journal*, v. 3, June 1957, p. 185-194.

Discusses some problems yet to be met before such aircrafts are practical.

12479 Summary of Drag Coefficients of Various Shaped Cylinders. C. F. Heddleson, D. L. Brown, and R. T. Cliffe. *General Electric, Atomic Products Division (U. S. Atomic Energy Commission)*, APEX-299, Apr. 1957, 56 p. (UF767 Un3.1ap Contin.)

Drag characteristics of circular, square, rectangular, triangular, diamond, and elliptical cylinders, as well as a large range of thickness-to-chord ratio symmetrical airfoil shapes, are presented as a function of Reynolds number. Certain Mach number characteristics are discussed.

12480 The Prediction of Nonlinear Pitching and Yawing Motion of Symmetric Missiles. Charles H. Murphy, Jr. *Journal of the Aeronautical Sciences*, v. 24, July 1957, p. 473-479.

12481 Optimum Nose Shapes for Missiles in the Superaerodynamic Region. W. J. Carter. *Journal of the Aeronautical Sciences*, v. 24, July 1957, p. 527-532.

Three separate cases are considered: ideal specular reflection, specular-type reflection from a slightly rough surface, and surface absorption followed by random emission of the striking molecules.

12482 Second-Order Subsonic Airfoil Theory Including Edge Effects. Milton D. Van Dyke. *U. S. National Advisory Committee for Aeronautics, Report* 1274, 1956, 23 p. (TL521 Un3r Vis.)

Several recent advances in plane subsonic flow theory are combined into a unified second-order theory for airfoil sections of arbitrary shape.

12483 Theoretical Investigation of Flutter of Two-Dimensional Flat Panels With One Surface Exposed to Supersonic Potential Flow. Herbert C. Nelson and Herbert J. Cunningham. *U. S. National Advisory Committee for Aeronautics, Report* 1280, 1956, 24 p. (TL521 Un3r Vis.)

A Rayleigh type analysis involving chosen modes of the panel as degrees of freedom is used to treat the flutter of a two-dimensional flat panel supported at its leading and trailing edges and subjected to a middle-plane tensile force.

12484 Thin Airfoil Theory Based on Approximate Solution of the Transonic Flow Equation. John R. Spreiter and Alberta Y. Alksne. *U. S. National Advisory Committee for Aeronautics, Technical Note* 3970, May 1957, 82 p. (TL570 Un3c)

See also: **13234** (meteoric dust erosion of the earth satellite); **13941** (aircraft refrigeration).

AGRICULTURE

12485* Pesticides Used on Highway Areas. J. W. Zukel and C. O. Eddy. *Agricultural Chemicals*, v. 12, July 1957, p. 38-39.

The type and cost of herbicides used.

12486* 1955-1956 Fertilizer Consumption in the U. S. Walter Scholl, Hilda M. Wallace, Esther I. Fox, and Florence B. Crammatte. *Agricultural Chemicals*, v. 12, July 1957, p. 65 + 6 pages.

Statistics on consumption by state and region; also data on grade and type of fertilizer consumed.

12487* Molybdenum in New Zealand Farming. C. During. *Alloy Metals Review*, v. 8, June 1957, p. 2-8.

Molybdenum has produced outstanding results in saving lime on hill country where lime cannot be cheaply applied, has proved quicker acting than agricultural lime, and saves relatively large amounts of limestone, up to ¾ tons per acre, on certain soils, where its use has led to much cheaper development of unimproved land.

12488* Growth and Controlled Morphogenesis in Pea Root Callus Tissue Grown in Liquid Media. John G. Torrey and Yoshio Shigemura. *American Journal of Botany*, v. 44, Apr. 1957, p. 334-344.

12489* Effects of Environmental Factors on the Growth of Two Varieties of Subterranean Clover *(Trifolium Subterraneum L)*. C. R. Millikan. *Australian Journal of Agricultural Research*, v. 8, May 1957, p. 225-245 + 2 plates.

A water culture experiment is described in which the effects of day and night temperature, photoperiod, light intensity, and phosphate level on the total growth and top/root ratio of the Dwalganup and Mt. Barker varieties of subterranean clover were studied.

12490* Ruminal Flora Studies. VIII. The Influence of Rate and Method of Feeding a Ration Upon Its Digestibility, Upon Ruminal Function, and Upon the Ruminal Population. R. J. Moir and M. Somers. *Australian Journal of Agricultural Research*, v. 8, May 1957, p. 253-265.

12491* Electric Oscillations Generated by Plant Roots and a Possible Feedback Mechanism Responsible for Them. B. I. H. Scott. *Australian Journal of Biological Sciences*, v. 10, May 1957, p. 164-179 + 1 plate.

An account is given of rhythmic variations which have been observed in an electric field generated by bean roots growing in water. These electric oscillations, which have periods of about 5 min., were studied using apparatus which records automatically at frequent intervals the potential pattern near the root. A description is given of this apparatus and of a very sensitive instrument for recording the rate of elongation of the root.

12492* Studies on Phytocides. II. Tests of Chlorinated Aryloxymethylphosphonous and Phosphonic Acids as Poisons and Auxins. C. G. Greenham. *Australian Journal of Biological Sciences*, v. 10, May 1957, p. 180-188.

Tests were made on pea epicotyls or oat coleoptiles with *o*-chloro-, *p*-chloro-, 2,4-dichloro-, and 2,4,5-trichloro-phenoxymethylphosphonous acids. The first compound behaved like a weak auxin, the third like an inactive substance or anti-auxin (depending on the test), and the remainder like anti-auxins.

12493 Insecticidal Properties and Characteristics of 1-Naphthyl *N*-Methylcarbamate. Harry L. Haynes, Joseph A. Lambrech, and Herbert H. Moorefield. *Boyce Thompson Institute, Contributions*, v. 18, Apr.-June 1957, p. 507-513.

This new chemical, designated as Sevin, has exhibited a broad insecticidal activity and possesses a low order of mammalian toxicity.

12494* Growth Depressing Factors in Rapeseed Oilmeal. II. Studies on Counteraction by Dietary Supplements. J. M. Bell and Elinor Baker. **III. Studies on Counteraction by Steam Processing, Extraction and Dietary Supplements.** J. M. Bell. **IV. Comparative Feeding Values of Argentine and Polish Types and the Effects of Supplementary Aureomycin, Fishmeal, Lysine, Iodide and Thyroid-Active Substances.** J. M. Bell. *Canadian Journal of Animal Science*, v. 37, June 1957, p. 21-49.

12495* Toxicological Studies of Southeastern Plants. II. Compositae. Wilber H. Ducan, Paul L. Piercy, Seldon D. Feurt, and Robert Starling. *Economic Botany*, v. 11, Jan.-Mar. 1957, p. 75-85.

Three native species of Baccharis are reported to be poisonous.

12496* Electricity in Modern Commercial Horticulture. C. A. Cameron Brown and A. W. Gray. *Institution of Electrical Engineers, Proceedings*, v. 104, pt. A, June 1957, p. 249-261.

Electricity has gained importance in providing bottom heat for propagation in frames and propagating cases, space heating, and providing artificial lighting.

12497* Studies on the Geotropism of Roots. II. The Effects of the Auxin Antagonist α-(1-Naphthylmethylsulphide) Propionic Acid (NMSP) and Its Interactions With Applied Auxins. L. J. Audus and M. E. Brownbridge. *Journal of Experimental Botany*, v. 8, June 1957, p. 235-249.

The mutual antagonisms shown between the auxins and NMSP are best explained in terms of an interference with access to the growth centers; competitive action at the growth centers themselves seems not to be involved.

12498* Phosphorylated Compounds in Plants. I. Adenosine and Uridine 5'-Phosphates in Pea Seedlings. K. S. Rowan. *Journal of Experimental Botany*, v. 8, June 1957, p. 256-271.

It has been shown that the γ phosphate-group of the ATP isolated reacts with phosphokinase enzymes in a manner similar to that of ATP extracted from muscle and yeast.

12499* Seed Spot Tests With Tetramine-Treated Seed in Northern California. D. F. Roy. *Journal of Forestry*, v. 55, June 1957, p. 442-445.

The standard acetone-tetrazine treatment did not inhibit germination of ponderosa pine seed, did inhibit germination of Douglas fir seed, and protected conifer seed from depredation by rodents. The dextrin-tetramine treatment did not protect conifer seed from rodents, but inhibited germination of ponderosa pine.

12500* The Sites of Orthophosphate Uptake by Barley Roots. C. E. Hagen, J. E. Leggett, and P. C. Jackson. *National Academy of Sciences of the United States of America, Proceedings*, v. 43, June 1957, p. 496-506.

Orthophosphate uptake by barley roots is coupled to sites identical with those for oxidative phosphorylation during electron transport in mammalian mitochondria.

12501* The Systemic Activity of Cycloheximide in Wheat Seedlings. V. R. Wallen and R. L. Millar. *Phytopathology*, v. 47, May 1957, p. 291-294.

12502 Weed Control by Insect. James K. Holloway. *Scientific American*, v. 197, July 1957, p. 56-62.

For 30 yrs. Klamath weed, a noxious plant imported from Europe, infested the range lands of northern Calif. It was brought under control by introducing its European insect enemies.

12503* Plant Uptake of Sr90, Y91, Ru106, Cs137, and Ce144 From Soils. E. M. Romney, J. W. Neel, H. Nishita, J. H. Olafson, and K. H. Larson. *Soil Science*, v. 83, May 1957, p. 369-376.

Only Sr-90 was readily taken up; this was concentrated in greatest amounts in leaf tissue. The highest Sr-90 levels were found in plants grown on acidic soils low in Ca, and lowest levels on the alkaline-calcareous soils.

12504* Factors Influencing Nematode Control by Ethylene Dibromide in Soil. C. A. I. Goring and C. R. Youngson. *Soil Science*, v. 83, May 1957, p. 377-389.

12505* Salt Concentration, a Factor in the Availability of Phosphorus From Rock Phosphate as Revealed by the Growth and Composition of Alfalfa. D. O. Howe and E. R. Graham. *Soil Science Society of America, Proceedings*, v. 21, Jan.-Feb. 1957, p. 25-28.

Effects of Ca, Mg, K, and Na salts.

12506* The Effect of Time and Rate of Fertilizer Application on the Yield, Composition, and Longevity of Alfalfa. W. W. Nelson and J. M. MacGregor. *Soil Science Society of America, Proceedings*, v. 21, Jan.-Feb. 1957, p. 42-46.

12507* An Investigation of Some of the Relationships Between Copper, Iron, and Molybdenum in the Growth and Nutrition of Lettuce. II. Response Surfaces of Growth and Accumulations of Cu and Fe. D. P. Moore, M. E. Harward, D. D. Mason, R. J. Hader, W. L. Lott, and W. A. Jackson. *Soil Science Society of America, Proceedings*, v. 21, Jan.-Feb. 1957, p. 65-74.

12508 Control of Rats and Mice in Grain Storage. E. W. Bentley. *World Crops*, v. 9, July 1957, p. 287-288.

Use of anti-coagulants such as warfarin and fumarin is discussed.

12509 Trace Elements in Plant Nutrition. T. Wallace. *World Crops*, v. 9, July 1957, p. 289-292.

A detailed account of the symptoms of excess and deficiency in plants. (To be continued.)

12510 Recent Advances in Residual Pre-Emergence Herbicides. Paul Bracey. *World Crops*, v. 9, July 1957, p. 298-300.

Use of 2:4-D.E.S., C.I.P.C., and P.D.U. herbicides.

12511* (German.) Relation Between Phosphate Economy and Photosynthesis. **Über die Beziehungen zwischen Phosphathaushalt und Photosynthese. IV.** The Stoichiometric Relation Between CO_2 Reduction and Phosphate Conversion. **Zur Frage einer stöchiometrischen Beziehung zwischen CO_2-Reduktion und Phosphatumsatz.** Otto Kandler. *Zeitschrift für Naturforschung*, v. 12B, May 1957, p. 271-280.

Changes in phosphate level in cells as a result of day-night light changes.

See also: **12512** (Parathion chromatography); **12527** (synthetic growth regulators); **12534** (radioactive C in wheat plants); **12546** (fermentation of agricultural products); **12777** (aryl alkyl sulfide insecticides).

BIOCHEMISTRY AND BIOPHYSICS

12512* (English.) **The Biochemical Evaluation of Paper Chromatograms of Parathion, Its Isomers and Analogues.** Klas-Bertil Augustinsson and Gunnel Jonsson. *Acta Chemica Scandinavica*, v. 11, no. 2, 1957, p. 275-282.

The chromatogram is divided into sections, the chlolinesterase inhibiting effects of which were measured against a system of acetylcholine and purified enzyme.

12513* (English.) **Changes in Liver Cell Elements During Stimulated Protein Synthesis. A Cytochemical Study.** G. F. Bahr. *Acta Radiologica*, Suppl. 147, 1957, 111 p.

12514 The Structure of the Type VIII Pneumococcus Specific Polysaccharide. J. K. N. Jones and M. B. Perry. *American Chemical Society, Journal*, v. 79, June 5, 1957, p. 2787-2793.

12515 The Amino Acid Sequence of Glucagon. I. Amino Acid Composition and Terminal Amino Acid Analyses. W. W. Bromer, A. Staub, E. R. Diller, H. L. Bird, L. G. Sinn, and Otto K. Behrens. **II. The Hydrolysis of Glucagon With Chymotrypsin.** W. W. Bromer, L. G. Sinn, and Otto K. Behrens. **III. The Hydrolysis of Glucagon by Trypsin.** W. W. Bromer, A. Staub, L. G. Sinn, and Otto K. Behrens. **IV. The Hydrolysis of Glucagon With Subtilisin.** L. G. Sinn, Otto K. Behrens, and W. W. Bromer. **V. Location of Amide Groups, Acid Degradation Studies and Summary of Sequential Evidence.** W. W. Bromer, L. G. Sinn, and Otto K. Behrens. *American Chemical Society, Journal*, v. 79, June 5, 1957, p. 2794-2810.

12516 Synthesis and Biological Activity of Some 6-(Substituted)-Aminopurines. Charles G. Skinner, Pete D. Gardner, and William Shive. *American Chemical Society, Journal*, v. 79, June 5, 1957, p. 2843-2846.

Thirteen new compounds were examined.

12517 Analogs of Tetracycline. I. Preparation of 1-(2-Hydroxyphenyl)-3-(2-Ketocyclohexyl) Propane-1,3-Dione and 1-(2-Hydroxyphenyl)-3-(2-Ketocyclohexyl)-3-Keto-1-Propene. Edward E. Smissman and R. Bruce Gabbard. *American Chemical Society, Journal*, v. 79, June 20, 1957, p. 3203-3205.

A method for the preparation of A and D ring analogs of tetracycline is discussed.

12518 Steroidal Sapogenins. XXXVI. Side Chain Bromination Isomers of Diosgenin and Tigogenin. Monroe E. Wall and Howard W. Jones. **XLII. Partial Synthesis of 11-Ketodiosgenin.** Edward S. Rothman and Monroe E. Wall. *American Chemical Society, Journal*, v. 79, June 20, 1957, p. 3222-3231.

12519 A Study of the Action of Acid and Alkali on Certain Purines and Purine Nucleosides. Milton Paul Gordon, Virginia S. Weliky, and George Bosworth Brown. *American Chemical Society, Journal*, v. 79, June 20, 1957, p. 3245-3250.

A series of glycosyl derivatives of various purines was found to be extremely labile toward dilute alkali at room temperature. In studies with 9-β-D-ribofuranosylpurine, two products resulting from cleavage of the imidazole ring, with loss of carbon-8 but without loss of the ribosyl group, were partially characterized.

12520 Studies on the Mechanism of Enzymatic Decarboxylation. Simon Rothberg and Daniel Steinberg. *American Chemical Society, Journal*, v. 79, June 20, 1957, p. 3274-3278.

A number of bacterial decarboxylases (aspartic acid, glutamic acid, tyrosine, and malonic acid) were investigated in an attempt to determine the role of the carboxyl group in decarboxylation. Decarboxylations were carried out in the presence of H_2O^{18} and the evolved CO_2 was examined for O^{18} enrichment.

12521* The Preparation and Pharmacological Properties of Some Chloral Derivatives. John F. Reinhard, Mary N. Lewis, Robert I. Meltzer, and John A. King. *American Pharmaceutical Association, Journal (Scientific Ed.)*, v. 46, June 1957, p. 359-363.

Two acetals of chloral and several derivatives of trichlorethanol were prepared and subjected to pharmacological evaluation for CNS-depressant activity. None was superior to chloral.

12522* The in Vitro Sensitivity of Routinely Isolated Bacteria to Streptonivicin and Novobiocin. Henry D. Isenberg. *Antibiotics & Chemotherapy*, v. 7, June 1957, p. 279-284.

These antibiotics are effective against 80 to 90% of the staphylococci and 60 to 70% of some other gram-positive organisms as well as against the three strains of *Hemophilus influenzae* studied. Only some of the *Enterobacteriaceae* and other gram-negative microorganisms were inhibited.

12523* Comparison of Fermentation Tube and Membrane Filter Techniques for Estimating Coliform Densities in Sea Water. I. Preliminary Report. Ray M. Conner. *Applied Microbiology*, v. 5, May 1957, p. 141-144.

The membrane filter technique is more economical in time, effort, and materials, but needs modification for improved selectivity.

12524* Studies on the Suspension Stability of Some Yeasts and Bacteria. W. R. Chesbro and L. R. Hedrick. *Applied Microbiology*, v. 5, May 1957, p. 145-148.

The sedimentation patterns of some yeast cells is a reflection of surface characteristics of the species and the particular environmental factors which influence these characteristics.

12525* Microbiological Determination of Vitamins and Amino Acids Produced by Microorganisms, Using the Dialysis Cell. Veikko Nurmikko. *Applied Microbiology*, v. 5, May 1957, p. 160-165.

12526* Rapid Heat Treatment of Bacteria. I. Sterilization of Suspensions of *Serratia marcescens* and Spores of *Bacillus subtilis var. Niger*. N. L. Norcross, R. B. Read, Jr., Warren Litsky, and E. B. Seligmann, Jr. *Applied Microbiology*, v. 5, May 1957, p. 193-196.

12527* (English.) **Studies on Synthetic Growth Substances. IX. The Configuration of N-Arylamino-Propionic Acids With Growth-Regulating Activity.** Arne Fredga. *Arkiv för Kemi*, v. 11, no. 1, 1957, p. 23-28.

The D-(+)-form is by far more active.

12528* (English.) **Chromatography of Deoxyribonucleic Acid on Calcium Phosphate.** Giorgio Semenza. *Arkiv för Kemi*, v. 11, no. 1, 1957, p. 89-96.

Deoxyribonucleic acid and its partial hydrolysis products were chromatographed on calcium-phosphate columns.

12529 Oxidation of *p*-Cresol and Related Compounds by a *Pseudomonas*. S. Dagley and M. D. Patel. Biochemical *Journal*, v. 66, June 1957, p. 227-233.

Study of the oxidation by bacteria of methyl groups of aromatic compounds. The extension of these studies to oxidation of xylenols provides information concerning the specificity of such mechanisms.

12530 Studies in the Biochemistry of Micro-Organisms. The Colouring Matters of Species in the *Aspergillus Nidulans Group*. II. Further Observations on the Structure of Asperthecin. S. Neelakantan, Anna Pocker, and H. Raistrick. *Biochemical Journal*, v. 66, June 1957, p. 234-237.

12531 The Action of Di*iso*propyl Phosphorofluoridate and Other Anticholinesterases on Amino Acids. R. F. Ashbolt and H. N. Rydon. *Biochemical Journal*, v. 66, June 1957, p. 237-242.

Action of di*iso*propyl phosphorofluoridate, di*iso*propyl phosphorochloridate and some other phosphorus-containing anticholinesterases on a number of amino acids under physiological conditions. Di*iso*propyl phosphorofluoridate, but not di*iso*propyl phosphorochloridate, is shown to react with the phenolic hydroxyl group of tyrosine under these conditions. Tetraethyl pyrophosphate is more reactive, but less selective, than di-*iso*propyl phosphorofluoridate towards amino acids.

12532* Powdery Mildews. C. E. Yarwood. *Botanical Review*, v. 23, Apr. 1957, p. 235-301.

Morphology; taxonomy and momenclature; host range; importance; symptomatology; life history; biologic specialization; host parasite relations; epidemiology control.

12533 Effect of Fungicides on Oxygen Consumption and Viability of Mycelial Pellets. S. E. A. McCallan and Lawrence P. Miller. *Boyce Thompson Institute, Contributions*, v. 18, Apr.-June 1957, p. 483-495.

Oxygen consumption of the pellets with endogeneous substrates was approximately 3μl. per mg. of fresh weight during 5 hrs.

12534 Studies on Wheat Plants Using C^{14} Compounds. III. The Utilization of Acetate for Amino Acid Biosynthesis. IV. Distribution of C^{14} in Glutamic Acid, Aspartic Acid, and Threonine Arising From Acetate-1-C^{14} and -2-C^{14}. E. Bilinski and W. B. McConnell. *Canadian Journal of Biochemistry and Physiology*, v. 35, June 1957, p. 357-371.

12535 4-*O*-Methyl-D-Glucuronic Acid and 4-*O*-Methyl-D-Glucose. P. A. J. Gorin. *Canadian Journal of Chemistry*, v. 35, July 1957, p. 595-598.

Preparation and properties.

12536* Extracellular Lysine Production by Various Fungi. M. Richards and R. H. Haskins. *Canadian Journal of Microbiology*, v. 3, June 1957, p. 543-546.

Cultures of over 600 fungi were screened for the production of extracellular free lysine in submerged agitated culture on a medium containing urea, cerelose, and mineral salts.

12537* Inhibition of Nonfolic-Acid-Requiring Organisms by Folic Acid Antagonists: Mechanism of Reversal. Virginia Mims McGlohon, Barbara Hoevet Peterson, and O. D. Bird. *Canadian Journal of Microbiology*, v. 3, June 1957, p. 569-578.

Several antagonists were quite active inhibitors of *Lactobacillus arabinosus* and several species of yeasts when grown in minimal media.

12538* A Disease of Grasshoppers Caused by the Bacterium *Pseudomonas aeruginosa* (Schroeter) Migula. Gordon E. Bucher and June M. Stephens. *Canadian Journal of Microbiology*, v. 3, June 1957, p. 611-625.

12539* Nutrition and Metabolism of Marine Bacteria. IV. The Participation of Na+, K+, and Mg++ Salts in the Oxidation of Exogenous Substrates by a Marine Bacterium. N. Tomlinson and Robert A. MacLeod. *Canadian Journal of Microbiology*, v. 3, June 1957, p. 627-638.

There is specific requirement for these ions in order to maintain metabolic activity.

12540 Artificial Estrogens. Jesse Grundy. *Chemical Reviews*, v. 57, Apr. 1957, p. 281-416.

Syntheses, characteristics, estrogenic activities, esters and ethers, and structural variations of diethylstilbestrol, hexestrol, and dienestrol.

12541 Physiochemical Studies on Starches. V. The Effect of Acid on Potato Starch Granules. J. M. G. Cowie and C. T. Greenwood. *Chemical Society, Journal*, June 1957, p. 2658-2665.

The degradative effect of 0.2 *M* HCl at 45 C on the granular structure and molecular size of the components of two varieties of potato starch were examined.

12542 The Control of Air Ionization and Its Biological Effects. W. Wesley Hicks and John C. Beckett. *Communication and Electronics*, no. 30, May 1957, p. 108-111.

The effects of ionized atmospheres on human beings and animals are reported.

12543* (Russian.) Comparative Study of the Ribonucleic Acid Composition in Different Species of Bacteria. **Sravnitel'noe izuchenie sostava robonukleinovykh kislot u razlichnykh vidov bakterii.** A. S. Spirin and A. N. Belozerskii. *Doklady Akademii Nauk SSSR*, v. 113, no. 3, Mar. 21, 1957, p. 650-651.

Studies on 12 types of bacteria.

12544 Drug Resistance of Microorganisms. Robert J. Schnitzer and Emanuel Grunberg. 395 p. 1957. Academic Press, New York. (QR46 Sch59d)

A critical survey of the methods, facts, and theories regarding drug-resistance and allied phenomena.

12545 Utilization of Plasticizers and Related Organic Compounds by Fungi. Sigmund Berk, Helen Ebert, and Leonard Teitell. *Industrial and Engineering Chemistry*, v. 49, July 1957, p. 1115-1124.

12546* (English.) **The Utilization of Agricultural Products by Microbial Fermentations.** Eric Nilsson. *IVA Tidskrift för Teknisk-Vetenskaplig Forskning*, v. 28, no. 3, 1957, p. 117-144.

Types of end products. Design of a pilot-plant. Microbial fermentations on pilot-plant scale.

12547 The Effect of Oxygen Supply on the Rate of Growth of *Aerobacter Cloacae*. R. Elsworth, V. Williams, and R. Harris-Smith. *Journal of Applied Chemistry*, v. 7, May 1957, p. 269-274.

12548* Effect of Gamma Irradiation on the Desoxyribonuclease II Activity of Isolated Mitochondria. Shigefumi Okada and Lee D. Peachey. *Journal of Biophysical and Biochemical Cytology*, v. 3, Mar. 1957, p. 239-248 + 2 plates.

Electron microscopic evidence indicates a causal relationship between increased enzymatic activity after irradiation and structural damage to the mitochondria. Damage is accompanied by a release of ultraviolet-absorbing materials which are probably nucleotide in nature.

12549* The Behavior of Influenza Viruses in Various Tissue Culture Systems. Irving J. Green, Melvin Lieberman, and William J. Mogabgab. *Journal of Immunology*, v. 78, Apr. 1957, p. 233-239.

12550 Enzyme Models. IV. Kinetics of the Catalyzed Decarboxylation of Benzoylformic Acid. Abraham S. Endler and Ernest I. Becker. *Journal of Physical Chemistry*, v. 61, June 1957, p. 747-752.

The rate of decarboxylation of benzoylformic acid in phenol solution, catalyzed by 3-aminooxindole, α-phenylglycine, and related compounds were studied. The range of temperature was 50 to 100 C.

12551* New Alkaloids From *Tiliacora Racemosa* Colebr. I. Isolation of Tiliacorine. K. V. Jagannadha Rao and L. Ramachandra Row. *Journal of Scientific & Industrial Research*, v. 16, sec. B, Apr. 1957, p. 156-158.

The empirical formula $C_{36}H_{38}O_6N_2$, $2H_2O$ is proposed for tiliacorine.

12552* Antibiotic Studies on Indian Soil Micro-Organisms. IV. *Streptomyces caiusiae*—A New Antibiotic-Producing Species of Streptomyces. S. A. Dhals, F. M. Poonawalla, and S. S. Bhatnagar. *Journal of Scientific & Industrial Research*, v. 16, sec. C, Apr. 1957, p. 76-80.

12553* (Russian.) Studies on the Physical Chemistry of Agar. **Issledovaniie v oblasti fiziko-khimii agara. I.** On the Method of Determining the Intrinsic Viscosity of Agar. **O metodike opredeleniia kharakteristicheskoi viazkosti agara.** S. A. Glikman and I. G. Shubtsova. *Kolloidnyi Zhurnal*, v. 19, no. 2, 1957, p. 172-177.

Determination of the concentration dependence of viscosity of agar solutions containing from 0.05 to 0.25 g. eq. per l. KCl. Calculation of intrinsic viscosity.

12554* (Russian.) The Mechanism of Protein Denaturation. **O mekhanizme denaturatsii belkov. X.** The Effect of Fatty Acid Anions on the Denaturation Stability of Globular Proteins. **Vliianie anionov zhirnykh kislot na ustoichivost' globuliarnykh belkov k denaturatsii.** A. L. Loseva and A. S. Tsyperovich. *Kolloidnyi Zhurnal*, v. 19, no. 2, 1957, p. 222-227.

12555* (Hungarian.) Tuberculostatic Materials. Production of *p*-Acetylamino-Benzaldehyde Thiosemicarbasone. **Tuberkulosztatikus hatású anyagok. A para-acetilaminobenzaldehid-tioszemikarbazon módosított előállítása.** Lajos Toldy, Dénes Spitz, and Ottó Clauder. *Magyar Kémiai Folyóirat*, v. 63, Jan. 1957, p. 27-28.

Experimental synthesis and properties.

12556* Some Biochemical Problems of Cancer Chemotherapy. Howard E. Skipper, Charles Heidelberger, and Arnold D. Welch. *Nature*, v. 179, June 8, 1957, p. 1159-1162.

Research is needed in the fields of drug resistance, physiological disposition and mechansims of action, multiple blocking, mechanism of metastasis and invasion, selective reduction of drug toxicity, and mechanisms of carcinogenesis.

12557 Biochemical Approaches to the Problem of Protein Synthesis. J. L. Simkin and T. S. Work. *Nature*, v. 179, June 15, 1957, p. 1214-1219.

Peptide bond formation; amino-acid activating enzymes; association of ribonucleic acid with protein synthesis; control of protein synthesis by nucleic acids.

12558 Neomycin, a Review and Digest of the Recent Clinical Literature. 82 p. 1957. S. B. Penick & Co., New York. (RM666.N35 P37n)

Review of recent literature on neomycin therapy in dermatology, eye, ear, nose, throat, and other infections, and in veterinary medicine.

12559* Effect of Amino Acids on the Virulence of *Helminthosporium Sativum* to Wheat Seedlings. S. B. Hrushovetz. *Phytopathology*, v. 47, May 1957, p. 261-264.

12560* (Polish.) The Possibility of Application of Ultrasonics in the Pharmaceutical Chemistry. **Możliwości stosowania ultradźwięków w chemii farmaceutycznej.** K. Topa and M. Topa. *Przemysł Chemiczny*, v. 13, Apr. 1957, p. 197-199.

12561 Quantitative Problems in Biochemistry. Edwin A. Dawes. 224 p. 1956. E. & S. Livingstone, Ltd., Edinburgh. (QD257 D32q)

Determination of mol. wts.; acid-base relationships of amino acids and proteins; thermodynamics; equilibria; reaction kinetics; enzyme kinetics; photometric analysis; manometry; bacterial growth; oxidation-reduction potentials; isotopes in biochemistry.

12562* Dependence of X-Ray Sensitivity of Yeast on Phase State and Anoxia. Thomas H. Wood and Austin L. Taylor. *Radiation Research*, v. 6, June 1957, p. 611-625.

Two related strains of yeast are compared under anoxic conditions, in the frozen state under aerobic conditions, or under anoxic conditions in the frozen state.

12563* Effect of Oxygen on Inactivation of Trypsin by the Direct Action of Electrons and Alpha-Particles. P. Alexander. *Radiation Research*, v. 6, June 1957, p. 653-660.

Irradiation dose required to inactivate solid trypsin is 30% greater in the absence than in the presence of O. No O effect is found for α-irradiation.

12564* (English.) **Mollisin, a Dichloronaphthoquinone Derivative Produced by the Fungus *Mollisia Caesia*.** G. J. M. Van der Kerk and J. C. Overeem. *Recueil des Travaux Chimiques des Pays-Bas*, v. 76, May 1957, p. 425-436.

The isolation and characterization of mollisin, the yellow pigment from the fungus *Mollisia caesia*, are described. Mollisin must be regarded as 2,3-dichloro-5-hydroxy-7-(or 6-methyl-8-acetonylnapthoquinone-1,4.

12565* Physico-Chemical Studies of Poly-D-Glutamic Acid From *Bacillus Anthracis* Grown *in Vitro*. L. H. Kent, B. R. Record, and R. G. Wallis. *Royal Society of London, Philosophical Transactions*, v. 250, ser. A, June 6, 1957, 43 p.

Viscosity; light scattering; diffusion; sedimentation.

12566 Zone Electrophoresis in a Density Gradient. Stability Conditions and Separation of Serum Proteins. Harry Svensson, Lennart Hagdahl, and Karl-David Lerner. *Science Tools*, v. 4, Apr. 1957, p. 1-10.

12567 Agammaglobulinemia. David Gitlin and Charles A. Janeway. *Scientific American*, v. 197, July 1957, p. 93 + 6 pages.

Refers to a disease in which the blood lacks gamma globulin. Because antibodies are found in gamma globulin, those who suffer from the disease are prey to grave infections.

12568 Powerhouse of the Cell. Philip Siekevitz. *Scientific American*, v. 197, July 1957, p. 131 + 7 pages.

Structure and function of the mitochondrion, a small body which appears to play a central role in the oxidation of foodstuff.

12569* Influence of Thrombin on Rate of Prothrombin Conversion. Donald G. Therriault, John L. Gray, and H. Jensen. *Society for Experimental Biology and Medicine, Proceedings*, v. 95, June 1957, p. 207-211.

Both antihemophilic factor and plasma accelerator-globulin are necessary to obtain complete conversion of prothrombin in the presence of a $BaSO_4$-eluate preparation from serum, phospholipid-thromboplastin, and $CaCl_2$. In the presence of traces of thrombin converison of prothrombin to thrombin becomes greatly accelerated.

12570* Analgesic Properties of Xylopropamine. S. C. Harris and R. C. Worley. *Society for Experimental Biology and Medicine, Proceedings*, v. 95, June 1957, p. 212-215.

A new sympathomimetic drug, xylopropamine sulfate (1-(3,4-dimethylphenyl)-2-aminopropane), was found capable of elevating the threshold of human subjects to experimentally induced pain.

12571 Effect of Time and Temperature Upon Survival of *Escherichia coli* in Sodium Chloride. Henry C. Reeves and Arthur P. Harrison, Jr. *Society for Experimental Biology and Medicine, Proceedings*, v. 95, June 1957, p. 278-282.

Suspensions of *E. coli* in 4.6 M NaCl stored under conditions which preclude cell division undergo at first a rapid decline in viable cells, but as the storage interval is extended the death rate continuously decreases until eventually it becomes negligible.

12572 Transport and Accumulation in Biological Systems. E. J. Harris. 291 p. 1956. Butterworths Scientific Publications, London. (QH601 H24t)

A compilation of information on the kinetics of movement of inorganic and simple organic substances between cells and their surroundings.

12573 Ultraviolet-Induced Biochemical Mutants of *Saccharomyces Cerevisiae*. Robert K. Mortimer, Ruth S. Lerner, and June K. Barr. *University of California, Radiation Laboratory (U. S. Atomic Energy Commission)*, UCRL-3746, Apr. 1957, 10 p. (UF767 U3u)

Methods and results of a search for biochemical mutant strains; preliminary biosynthetic and genetic studies with some of the strains.

12574 Acceleration of Aging by Ionizing Radiation. George W. Casarett. *University of Rochester (U. S. Atomic Energy Commission)*, UR-492, June 1957, 15 p. (UF767 Un3.1ru Contin.)

Sublethal irradiation of the whole body or substantial volumes of vital tissue causes premature death or shortening of life primarily by accelerating actual biological aging processes, which in turn causes earlier onset of the diseases of the species associated with or promoted by aging processes.

12575 Vitamin A. Thomas Moore. 645 p. 1957. Elsevier Publishing Co., New York. (QP801.V5 M78v)

A comprehensive collection of basic information assembled over a 30-yr period, with special emphasis on relationships between vitamin A and the endocrine system.

See also: **12691** (paper chromatography as a taxonomic tool); **12741** (ribose and glucopyranosyl purine derivatives); **12745** (hypotensive agents); **12749** (synthesis of steroids); **13902** (microorganisms in organic waste disposal).

CERAMICS AND CONCRETE

12576 (German.) Phases of Thermal Equilibrium of the System MgO-$3CaO \cdot SiO_2$-$2CaO \cdot SiO_2$-$3CaO \cdot Al_2O_3$-$4CaO \cdot Al_2O_3 \cdot Fe_2O_3$. Equilibrium of Dolomite Refratcory Material. **Die Phasen thermischer Gleichgewichte des Systems MgO-$3CaO \cdot$**

SiO_2-2CaO·SiO_2-3CaO·Al_2O_3-4CaO·Al_2O_3·Fe_2O_3. Die Gleichgewichte der dolomitischen feuerfesten Stoffe. Von S. Solacolu. *Berichte der Deutschen Keramischen Gasellschaft*, v. 34, May 1957, p. 141-147.

Determination of phase diagrams of various sections of this five-component system.

12577* The Properties of MgO Powders Prepared by the Decomposition of $Mg(OH)_2$. D. T. Livey, B. M. Wanklyn, M. Hewitt, and P. Murray. *British Ceramic Society, Transactions*, v. 56, May 1957, p. 217-236.

Particles prepared by decomposition at various temperatures, both in air and vacuum, were examined by electron micrographs and by measurements of density, surface area, and heat of solution.

12578* Basic Refractories: Variation With Temperature of Modulus of Elasticity. W. R. Davis and G. R. Rigby. *British Ceramic Society, Transactions*, v. 56, May 1957, p. 259-276.

In a predominantly single-phase material with a crystalline bond, the modulus tends to decrease with increasing temperature. A heterogeneous body such as a chrome-magnesite brick shows an increase in the modulus with rise in temperature, the modulus/temperature curve tending to become exponential in shape.

12579* Ball Mills and Ball Milling. II. T. G. Callcott. *British Coal Utilisation Research Association, Monthly Bulletin*, v. 21, Apr. 1957, p. 153-171.

Theory; motions of charge; applications to pulverization of coal.

12580 Use of High-Alumina Brick in Hot-Blast Stoves. A. I. Kulik, A. P. Rogach, L. D. Salganik, T. I. Papin, and V. V. Ostanin. *Henry Brutcher Translation No.* 3867, 6 p. (From *Stal'*, v. 16, no. 7, 1956, p. 582-585.) Henry Brutcher, Altadena, Calif.

Comparative behavior of chrome-magnesite brick and silica brick when exposed to top gas having an above-normal dust content.

12581 Ways of Extending the Life of Blast Furnaces. S. I. Shkumatov. *Henry Brutcher Translation No.* 3868, 10 p. (From *Stal'*, v. 16, no. 3, 1956, p. 200-203.) Henry Brutcher, Altadena, Calif.

A report on experiences with various refractory materials in the course of 12 yrs. of operation.

12582 Method of Introducing Radioactive Calcium Into a Refractory Composition. E. V. Levintovich, A. N. Lyulichev, O. M. Margulis, and D. M. Shakhtin. *Henry Brutcher Translation No.* 3883, 5 p. (From *Ogneupory*, v. 21, no. 2, 1956, p. 73-75.) Henry Brutcher, Altadena, Calif.

Calcium-45 is introduced as dead-burned fireclay grog with plastic fireclay as binder.

12583* Some Factors Having an Influence on the Fired Dimensions of Clay Ware, With Special Reference to Firebricks. C. Edwards. *Claycraft*, v. 30, June 1957, p. 468-472.

General discussion of size tolerances and effects of composition and processing variables on shrinkage. (To be continued.)

12584* (Czech.) Refractory Linings of Rotary Furnaces for Bloomery Process. **Žarovzdorné vyzdívky hrudkovacich peci.** Eugen Viktora and Vaclav Zavesky. *Hutnicke Listy*, v. 12, May 1957, p. 417-423.

Completely sintered materials give the greatest durability. Directions on how to increase service life of linings.

12585* (French.) High Temperature Refractories. **Les produits réfractaires caractérisés par une réfractairité élevée.** J. Batigne. *Industrie Céramique*, no. 486, May 1957, p. 127-138.

General review of characteristics and uses of SiC, high-alumina refractories, ZrO_2, ZrO_2·SiO_2, CaO·ZrO_2, MgO, ThO_2, and BeO.

12586* (French.) The Quality of Refractory Products Examined by Resonance and Ultrasonics. **Méthodes d'ausculation dynamique appliquées au contrôle de qualité des produits réfractaires.** C. Deplus. *Industrie Céramique*, no. 486, May 1957, p. 162-175.

Effects of structural defects on vibration and ultrasonic wave propagation in solids. Apparatus and application to the modulus of elasticity test and detection of pores and cracks in refractories.

12587* (Spanish.) Silica Bricks for Electric-Arc Furnace Roofs. Transformations in Service. **Ladrillos de silice para bovedas de hornos electricos de arco. Transformaciones durante su uso.** Eugenio Perez Blanco. *Instituto del Hierro y del Acero*, v. 10, Jan.-Mar. 1957, p. 4-10.

Physical properties, chemical analysis, and petrographic examination of the zones of a silica brick in an electric arc furnace for the treatment of iron. Possibility of replacing silica by other refractories.

12588 Phase Relations in the System $BaCl_2$-$BaTiO_3$. D. E. Rase and Rustum Roy. *Journal of Physical Chemistry*, v. 61, June 1957, p. 744-747.

Studies using thermal curve, strip-furnace, and quench techniques. The system is a simple eutectic-type with limited solid solubility near the barium titanate end-member.

12589 The Use of Wollastonite in Ceramic Bodies. Milan Vukovich, Thomas L. Stalter, Ralph DeVille, James E. Johnson, and Loren Dean Sanders. *Ohio State University, Engineering Experiment Station, Bulletin No.* 164, v. 26, May 1957, 79 p. (TA21 O3b Vis.)

Bodies of high wollastonite content offer promise for the production of nonvitreous whitewares. They possess a good combination of strength, low warpage, very low moisture expansion, and thermal-shock resistance.

12590 Neutron-Diffraction Study of the Magnetic Properties of Perovskite-Like Compounds $LaBO_3$. W. C. Koehler and E. O. Wollan. *Physics and Chemistry of Solids*, v. 2, Apr. 1957, p. 100-106.

Survey of compounds $LaBO_3$ in which B is a trivalent ion of one of the 3-*d* transition group elements Cr, Mn, Fe, Co, and Ni.

12591 Further Studies on the Effect of Entrained Air on Strength and Durability of Concrete With Various Sizes of Aggregates. Paul Klieger. *Portland Cement Association Research Department Bulletin* 77, Nov. 1956, 19 p. (TP883 P83b Vis.)

Tests with concretes made with a crushed limestone as the coarse aggregate confirmed earlier conclusion that optimum air content can be obtained by providing a relatively constant air content in the mortar fraction, despite changes in cement content, consistency, maximum size of aggregate, or type of aggregate. This mortar air-content appears to be in the range of 9 ± 1%.

12592* (French.) Sintering of Alumina and Silica Under Pressure. **Frittage sous charge de l'alumine et de la glucine.** R. Caillat and R. Pointud. *Revue de Métallurgie*, v. 54, Apr. 1957, p. 277-282.

Densities close to the maximum theoretical density are quickly reached at 1,600 C and higher, under pressures of about 200 kg. cm^2.

12593* (French.) Research on the Crushability of Materials. **Recherches sur la broyabilité de la matière.** Michel Papadakis. *Revue des Matériaux de Construction*, C, no. 500, May 1957, p. 131-139.

The crushability of a material, free from impurities, is independent of fineness, and may be defined by a single number. Heterogeneous bodies offer several successive crushabilities, depending on the fineness required.

12594* (German.) Some Tests on Ion Exchange at Glass Surfaces. **Einige Versuche über Ionenaustausch an Glasoberflächen.** Wilhelm Hinz. *Silikattechnik*, v. 8, Apr. 1957, p. 136-139.

An account of adsorption tests of glass plates treated in different ways with radioactive Sr solutions. A reversible regular cation exchange is possible at the glass surface.

12595* (French.) The Function of Surface Tension in the Casting Process Used in Ceramics. **Tension superficielle des barbotines ceramiques.** H. Salmang. *Société Française de Céramique, Bulletin No.* 34, Jan.-Mar. 1957, p. 3-10.

12596* (French.) Disintegration of Refractory Clays by Expansive Carbon Deposits Caused by the Dissociation of Carbon Monoxide in Contact With Ferruginous Elements. **La desagregation des argiles refractaires par depot expansif de carbone du a la dissociation de l'oxyde de carbone au contact d'elements ferrugineux.** Y. Letort and Schoendoerffer.

Société Française de Céramique, Bulletin No. 34, Jan.-Mar. 1957, p. 29-42.

12597* (French.) Improvement of the Properties of Forsterite Refractories. **Amelioration des proprietes des refractaires en forsterite.** Rabindar Singh, V. K. Moothy, and P. C. Sen. *Société Française de Céramique, Bulletin No.* 35, Apr.-June 1957, p. 21-33.

Compositions in the region of $2MgO \cdot SiO_2$-$2MgO \cdot TiO_2$-MgO are eminently suitable for increasing refractoriness and heat-shock resistance in forsterite refractories.

12598* (French.) Influence of Alkalines and Alkaline-Earths on the Physico-Chemical Properties of Kaolins. M. J. Meneret. *Société Française de Céramique, Bulletin No.* 35, Apr.-June 1957, p. 35-40.

12599* (French.) Dilatometric Properties of Phyllitic Minerals Between 0 and 1400 C. **Proprietes dilatometriques des mineraux phylliteux entre 0 et 1400°.** Ch. Kiefer. *Société Française de Céramique, Bulletin No.* 35, Apr.-June 1957, p. 95-114.

Dilatometry of various minerals, clays, and ceramic bodies.

12600* (Russian.) Joining of Glass Pipes and Irregularly Shaped Parts to Pipe-Lines. **Svarka stekliannykh trub i fasonnykh detalei k truboprovodam.** E. G. Frolova, G. V. Pototskaia, I. E. Shapiro, and A. N. Afanasev. *Steklo i Keramika,* v. 14, May 1957, p. 24-27.

Description of benches used in welding of glass pipes of different diameters. Pipe joining methods.

12601* (Russian.) Ceramic Nozzles for Gas-Arc Apparatus. Keramicheskie nakonechniki dlia gazo-dugovoi apparatury. Ts. S. Chromova. *Svarochnoe Proizvodstvo, no.* 5, May 1957, p. 24-25.

Describes ceramic nozzles for gas-shielded arc welding, made of microlite, pyrophyllite, cordierite, or corundum ceramics. Advantages of using these nozzles for welding at an angle or in difficultly accessible spots.

12602 Influence of Crucible Materials on High-Temperature Properties of Vacuum-Melted Nickel-Chromium-Cobalt Alloy. R. F. Decker, John P. Rowe, and J. W. Freeman. *U. S. National Advisory Committee for Aeronautics, Technical Note* 4049, June 1957, 34 p. (TL570 Un3t)

A study of the effect of induction-vacuum-melting practice on the high-temperature properties of 55Ni-20Cr-15Co-4Mo-3Ti-3Al alloy revealed that a major variable was the type of ceramic used as a crucible. Reactions between the melt and magnesia or zirconia crucibles apparently increased high-temperature properties at 1,600 F by introducing small amounts of B or Zr into the melts. Heats melted in alumina crucibles had relatively low rupture life and ductility at 1,600 F and were prone to crack during hot-working.

12603* (German.) Glass Fiber Products for the Electric Industry. **Glasfasererzeugnisse für die Elektroindustrie.** Hans Kallas. *VDI Zeitschrift,* v. 99, Apr. 1957, p. 502-506.

Description of mechanical and electric properties of glass fibers, and their many applications in the electric industry.

12604 A Study of Hot Pressing of Beryllia Rocket Nozzles. Chester A. Bielawski, Theodore M. Harkulich, and Russell E. Long. *Wright Air Development Center, Materials Laboratory, WADC Technical Report* 57-32, May 1957, 50 p. (TL507 Un3.18w Vis.)

The 20 specimens investigated were composed of four groups representing variations in starting materials with regard to particle size and purity, and variations in fabrication procedures, including time, temperature, and heat treatments, which affected the final structure. Two grades of beryllia representing the intermediate particle-size range, but with varying purity, were more readily hot pressed than either very fine or coarse particles.

12605* (German.) Structural Viscosity of Thixotropic Suspensions, Especially Bentonite Suspensions. **Die Strukturviskosität thixotroper Suspensionen, insbesondere Bentonitsuspensionen.** S. Peter and I. Stolle. *Zeitschrift für Physikalische Chemie (Frankfurt),* v. 11, May 1957, p. 251-266.

Determination of flow curves of various concentrations of bentonite at 20 C using the Couette rotational viscosimeter.

See also: **12702** (analysis of alumina-silicates); **12955** (system TiO_2-ZrO_2); **13345** (cracks in concrete); **13401** (corrosion of Al_2O_3 and CaF_2 by fluorine); **13558** (strength of graphite); **13843** (Sr ferrites and cobaltites).

CHEMICAL ENGINEERING

12606 Rate Studies in Tubular Reactors. Eric Weger and H. E. Hoelscher. *A.I.Ch.E. Journal,* v. 3, June 1957, p. 153-156.

The reaction between H and the olefin-1 hydrocarbons was investigated using Pd black on carbon as catalyst.

12607 Performance of Packed Columns. IV. Effect of Gas Properties, Temperature, and Pressure on Gas-Phase Mass Transfer Coefficients. H. L. Shulman and J. E. Margolis. *A.I.Ch.E. Journal,* v. 3, June 1957, p. 157-160.

To test the applicability of the mass transfer correlation, 0.5-in. naphthalene Berl saddles were vaporized into air, CO_2, and Freon-12 in a 4-in. column. Temperatures from 15 to 73 C and pressures from 0.26 to 1 atm. were covered.

12608 Absorption and Stripping-Factor Functions for Distillation Calculation by Manual- and Digital-Computer Methods. Wayne C. Edmister. *A.I.Ch.E. Journal,* v. 3, June 1957, p. 165-171.

New functions were developed for use in computing multicomponent separations in fractionators, reboiled absorbers, refluxed strippers, and columns with side-stream strippers.

12609 Froth-Frothate Concentration Relations in Foam Fractionation. Victor Kevorkian and Elmer L. Gaden, Jr. *A.I.Ch.E. Journal,* v. 3, June 1957, p. 180-182.

Clean air streams of 88, 91, and 96% water saturation were bubbled into aqueous solutions of isobutyl alcohol. Alcohol concentration in the collected and collapsed foam was plotted against its concentration in the bulk liquid.

12610 Separation of Liquids by Thermal Diffusion. John E. Powers and C. R. Wilke. *A.I.Ch.E. Journal,* v. 3, June 1957, p. 213-222.

Separations of ethyl alcohol-water and benzene-*n*-heptane mixtures in flat-plate continuous-flow thermogravitational columns were measured, flow rate, column length, temperature difference, spacing between plates, and inclination of the plates being varied in the experiments.

12611 Radioisotope Technique for the Determination of Flow Characteristics in Liquid-Liquid Extraction Columns. S. E. Markas and R. R. Beckmann. *A.I.Ch.E. Journal,* v. 3, June 1957, p. 223-229.

12612 Reaction Kinetic Studies: Catalytic Dehydrogenation of Secbutyl Alcohol to Methyl Ethyl Ketone. Joseph J. Perona and George Thodos. *A.I.Ch.E. Journal,* v. 3, June 1957, p. 230-235.

Reaction kinetics were investigated at atmospheric pressure and temperatures ranging from 650 to 750 F in the presence of solid brass spheres, ⅜ in. in diameter.

12613 Control of Continuous-Flow Chemical Reactors. Olegh Bilous, H. D. Block, and Edgar L. Piret. *A.I.Ch.E. Journal,* v. 3, June 1957, p. 248-261.

Frequency response equations are developed for simple and complex reactions of any order, and their applications are illustrated with selected numerical examples and by the use of polar plots.

12614 Some Remarks on Longitudinal Mixing or Diffusion in Fixed Beds. Rutherford Aris and Neal R. Amundson. *A.I.Ch.E. Journal,* v. 3, June 1957, p. 280-282.

A comparison of the solutions obtained from the mixing and turbulent diffusive mechanisms shows that the axial Peclet number for agreement of the two must be about two, as a limiting case for high Reynolds numbers.

12615* Glassy Phosphates in Water Treatment. George L. Illig, Jr. *American Water Works Association, Journal,* v. 49, June 1957, p. 805-816.

Sodium phosphate glass is used to prevent deposition of $CaCO_3$ scale, to control corrosion, to stabilize dissolved Fe or Mn, or for a combination of these purposes.

12616* (English.) **Temperature Distribution Within Cylindrical Electrophoresis Columns of Large Capacity, Stabilized by Capillary Systems. Construction of a Flexible Apparatus Suitable for Fractionations on a Ten Gram Scale.** Jerker Porath. *Arkiv för Kemi*, v. 11, no. 2, 1957, p. 161-184.

12617* Methods for Producing Uniform Gas Flow in Processing Equipment. *British Chemical Engineering*, v. 2, July 1957, p. 359-363.

Offers practical design data for various means of promoting uniform flow in industrial catalytic reactors, adsorbers, electrostatic precipitators, absorption columns, and cyclonic separators.

12618 Cresylic Acid Refining Now Goes Continuous. T. P. Forbath. *Chemical Engineering*, v. 64, July 1957, p. 228-231.

Flow sheet of new process featuring continuous extraction of impurities with two countercurrent solvent streams.

12619 Your Design Reference File. IV. Ralph Cushing. *Chemical Engineering*, v. 64, July 1957, p. 247-253.

Data on selection of compressors, ejectors, and educators; design and cost estimating.

12620 Predict Liquid Heat Capacities. Wallace R. Gambill. *Chemical Engineering*, v. 64, July 1957, p. 263-268.

Useful calculation methods are gathered in one place for the first time.

12621 Gas Prepurification for Low Temperature Processing. Norman C. Updegraff. *Chemical Engineering Progress*, v. 53, June 1957, p. 268-271.

A review of commercial practice.

12622 Drying Aqueous Sodium Sulfate in the Jet Spray Dryer. H. A. McLain, E. W. Comings, and J. E. Myers. *Chemical Engineering Progress*, v. 53, June 1957, p. 282-288.

12623 Material Balance in Complex and Multistage Recycle Chemical Processes. M. F. Nagiev. *Chemical Engineering Progress*, v. 53, June 1957, p. 297-303.

A mathematical method for determining material balances.

12624* Fresh Water From Salt Water: Present Position and Future Prospects. D. Neville-Jones. *Colonial Plant and Animal Products*, v. 6, no. 1, 1956, p. 33-41.

Electrodialysis may prove to be the cheapest process for waters containing 4000 to 9000 p.p.m. salt. Above this, some form of distillation seems most practical.

12625 High Temperature Heating With Liquids. Bernard S. Breitman. *Consulting Engineer*, v. 9, July 1957, p. 96-101.

Advantages of liquid heating; process applications; available media; equipment design.

12626* (German.) Thermic-Catalytic Fission of Isomers of Dodecane and Hexadecane. **Über die thermisch-katalytische Spaltung von isomeren Dodecanen und Hexadecanen.** Ernst Terres and Gregor Groppenbächer. *Erdöl und Kohle*, v. 10, May 1957, p. 281-285.

Isomerization of straight chain hydrocarbons. Yield and nature of products obtained.

12627* (Japanese). **Utilization of Radioisotopes in the Petroleum Industry.** Tōzō Amemiya, Naoomi Yamaki, and Eichi Tsunetomi. *Fuel Society of Japan, Journal*, v. 36, May 1957, p. 456-471.

Utilization in petroleum transportation, physical and chemical processes in petroleum refining, evaluation and investigation of quality of petroleum products, and chemical analysis of petroleum products.

12628 Removal of Iodine-131 From Dissolver Off-Gas Streams by Isotopic Exchange. E. D. McClanahan, Jr. *Hanford Atomic Products Operation (U. S. Atomic Energy Commission)*, HW-47676, Nov. 1956, 19 p. (UF767 Un3.1hw Contin.)

Iodine atoms in plant off-gas streams exchange with those in solid AgI in the temperature range 250 to 350 C.

12629 The Operation of Packed Towers in the Presence of Froth. S. H. Horwich. *Industrial Chemist*, v. 33, June 1957, p. 275-279.

12630 Preparation of Acetylacetone Using Sodium Alkoxide and Dispersed Sodium as Catalysts. K. K. Georgieff. *Industrial and Engineering Chemistry*, v. 49, July 1957, p. 1067-1070.

Reduction in costs, hazards, and time of reaction makes this process commercially attractive.

12631 Evaluation of Mixing Efficiency of Processing Equipment. Alan Beerbower, E. O. Forster, J. J. Kolfenbach, and H. G. Vesterdal. *Industrial and Engineering Chemistry*, v. 49, July 1957, p. 1075-1078.

Radioactive I is the tracer in a method for evaluating the mixing efficiency of process equipment in a short time, at little cost, and without permanently contaminating the products studied.

12632 The Nature of Vanadium in Petroleum. Leland K. Beach and James E. Shewmaker. *Industrial and Engineering Chemistry*, v. 49, July 1957, p. 1157-1164.

Data should help minimize vanadium's harmful effect on corrosion and catalyst loss.

12633 Supersaturation in Hydrocarbon Systems. *n*-Pentane in the Liquid Phase. W. B. Nichols, L. T. Carmichael, and B. H. Sage. *Industrial and Engineering Chemistry*, v. 49, July 1957, p. 1165-1172.

Bubble formation experiments with *n*-pentane confirm earlier findings that supersaturation in hydrocarbon liquids must be investigated statistically, a matter of technical interest in petroleum production and refining.

12634 Derivation and Precision of a New Vapor Pressure Correlation for Petroleum Hydrocarbons. J. B. Maxwell and L. S. Bonnell. *Industrial and Engineering Chemistry*, v. 49, July 1957, p. 1187-1196.

An improved linear correlation for the vapor pressure of hydrocarbons and hydrocarbon mixtures.

12635 Kinetics of Catalytic Oxidation of Sulphur Dioxide for Comparison of Fixed and Fluid Bed Reactors. Max Goldman, L. N. Canjar, and R. B. Beckmann. *Journal of Applied Chemistry*, v. 7, May 1957, p. 274-284.

Surface reaction between activatedly adsorbed atomic O and activatedly and adsorbed SO_2 is the rate-controlling step for both the confined and fluidized surface catalytic operations where mass transfer effects are negligible. Fluid operation indicates an effectiveness factor 3.59 times greater than that for the confined bed operation.

12636* (Russian.) Practical Problems in Alkylation of Benzene With Olefin. **Prakticheskie voprosy alkilirovaniia benzola olefinami.** B. D. Kruzhalov. *Khimicheskaia Promyshlennost'*, no. 2, Mar. 1957, p. 70-76.

A practical method of alkylation of benzene with olefin in the presence of $AlCl_3$.

12637* (English.) **Studies on the Counter Current Liquid-Liquid Extraction Column With Stirrers. I.** Sinji Nagata and Wataru Eguchi. *Kyoto University, Memoirs of the Faculty of Engineering*, v. 19, Apr. 1957, p. 102-122.

The relation between column efficiency and operating conditions is considered.

12638* Evaporators for the Fine Chemical Industry. C. Armstrong, N. R. Bell, and H. D. Murray. *Manufacturing Chemist*, v. 28, June 1957, p. 263-268.

By applying modern techniques, evaporation of fine chemicals may be successfully carried out at quite low temperatures and under conditions which give no perceptible loss in product quality.

12639 Hydrogen Peroxide and the Peroxide Compounds. *Massachusetts Institute of Technology, Department of Chemical Engineering, Report No. 52, for Office of Naval Research Contract No.* NR-092-008, Apr. 1957, 72 p. (Q1 M38.4r Contin.)

(Translated from the Russian by G. E. Halpern.) Supplementary material included in the Russian edition (1951) of "Wasserstoffsuperoxyd und die Perverbindungen" by W. Machu. New material deals largely with manufacturing techniques, handling, and industrial uses, and is entirely abstracted from the literature.

12640 How to Estimate Pressure Drop in Heaters. Paul Buthod. *Oil and Gas Journal*, v. 55, July 1, 1957, p. 111-118.

A family of enthalpy lines superimposed on the phase diagram of the stock being vaporized makes it possible to run a continuous heat balance on the heater while making a graphical integration to evaluate the pressure vs. length curve.

12641 Acetylene. Peter W. Sherwood. *Petroleum Processing*, v. 12, June 1957, p. 88-93.

Technical details on acetylene production by the partial combustion process, plus significant figures on why it's a booming product.

12642 How to do a Better Job of Low Temperature Insulation. Ron Cannon. *Petroleum Processing*, v. 12, June 1957, p. 97-112.

Types of thermal insulation and their important properties; special problems and their solutions; correct installation of a complete system; maintenance.

12643 Reactors Can "Float" on Ball Bearings! Edward P. Owen. *Petroleum Refiner*, v. 36, June 1957, p. 129-132.

Unique system of design minimizes the amount of alloy piping necessary for flexibility between reactors and heaters.

12644 Minimum Velocity for Catalyst Flow. III. Fluid Catalyst Design Data. Frederick A. Zenz. *Petroleum Refiner*, v. 36, June 1957, p. 133-142.

Correlations to determine saturation carrying capacity and for the prevention of saltation (in horizontal tubes) and choking (in vertical tubes) are presented.

12645 How to Figure Minimum Reflux. James B. Bachelor. *Petroleum Refiner*, v. 36, June 1957, p. 161-170.

You do not need to assume constant relative volatility nor constant molal overflow to calculate minimum reflux in multicomponent distillation by this method.

12646* The Protection of Chemical Process Equipment. The Use of Platinum Metals for Bursting Discs. J. M. Pirie. *Platinum Metals Review*, v. 1, Jan. 1957, p. 9-13.

12647* Platinum Catalysts in Petroleum Refining. S. W. Curry. *Platinum Metals Review*, v. 1, Apr. 1957, p. 38-43.

General nature of the processes; reactions in reforming; characteristics of charge and product; variations in practice.

12648* (Italian.) Aromatization of Paraffins With SO_2 in the Presence of Catalysts in Fixed and Fluid Bed Plants. **Aromatizzazione di paraffine, con SO_2, su catalizzatori fissi e fluidizzati.** M. Teplitz, R. Reed, and J. O. Maloney. *Rivista dei Combustibili*, v. 11, Apr. 1957, p. 231-244.

Reactions between SO_2 and n-hexane, n-heptane, and n-octane in the presence of catalysts such as active carbon, attapulgite, and chromia-alumina were studied. The SO_2 causes the aromatizing reaction to become strongly exothermic, while this reaction, under normal conditions is weakly endothermic. Plant construction and operation is outlined.

12649 (German.) Ullmann Encyclopedia of Industrial Chemistry. **Ullmanns Encyklopädie der Technischen Chemie.** Wilhelm Foerst. v. VIII. 860 p. 1957. Urban & Schwarzenberg, München-Berlin. (TP9 U15 Ref.)

Covers "Gefrierschutzmittel" to Ir.

12650* Review of Recent U. S. Patents on Desulfurization. Heinz Heinemann and Harold Shalit. *World Petroleum*, v. 28, June 1957, p. 66 + 2 pages.

Review of recent patents on petroleum hydrosulfurization, chemical desulfurization, and sweetening.

See also: **12579** (ball mill theory); **13180** (hydraulics of wetted-wall columns); **13223** (desulfurization of coke-oven gas); **13454** (oxygen generating plants); **13909** (water purification); **13972** (redwood cooling towers); **14002** (operational calculus in chemical engineering).

CHEMISTRY—ANALYTICAL

12651 Ion Exchange Separation of Gram Quantities of Americium From a Kilogram of Lanthanum. D. E. Armstrong, L. B. Asprey, J. S. Coleman, T. K. Keenan, L. E. LaMar, and R. A. Penneman. *A.I.Ch.E. Journal*, v. 3, June 1957, p. 286-288.

The separation of 4.5 g. of Am from approximately a kg. of light rare earths (primarily La) was achieved on a pilot plant scale by chromatographic displacement of the mixture from Dowex-50 resin with 0.1% ammonium citrate at pH 8 into hydrogen-form Dowex-50.

12652 Chromatographic Analysis of Mixtures of Mono-, Di-, and Tristearin Containing Mineral Oil. Louis J. Ravin, Robert J. Meyer, and Takeru Higuchi. *American Oil Chemists' Society, Journal*, v. 34, June 1957, p. 261-263.

12653 Electrolytic Extraction of Carbides From Carbon Steel. R. W. Gurry, J. Christakos, and C. D. Stricker. *American Society for Metals, Transactions*, v. 50, *Preprint No.* 4, 1957, 32 p. (TS300 Am35t Vis.)

Description and operation of simple, effective apparatus.

12654* A Recording Spectrophotometric Titrimeter. Robert A. Chalmers and C. A. Walley. *Analyst*, v. 82, May 1957, p. 329-336.

Apparatus for the determination of titrimetric end-points from an automatic recording of the rate of change of optical density of the solution being titrated, is useful for the titration of very dilute solutions and of small amounts of more concentrated solutions.

12655* The Colorimetric Determination of Cadmium, Chromium, Copper, Iron, Lead, Manganese, Nickel and Zinc in Sewage and Industrial Wastes. A. A. Christie, J. R. W. Kerr, G. Knowles, and G. F. Lowden. *Analyst*, v. 82, May 1957, p. 336-342.

12656* The Use of Elution Chromatography From Cellulose Columns for the Systematic Analysis of Special Steels. G. Venturello and A. M. Ghe. *Analyst*, v. 82, May 1957, p. 343-352.

Proposed method is successful for determination of Mo, Co, Mn, V, Ni, and Cr.

12657* The Micro-Determination of Active Hydrogen in Organic Compounds by Reaction With Lithium Aluminium Hydride. A. F. Colson. *Analyst*, v. 82, May 1957, p. 358-362.

12658* The Quantitative Determination of the Antioxidants Propyl, Octyl and Dodecyl Gallate in Oils and Fats. H. J. Vos, H. Wessels, and C. W. Th. Six. *Analyst*, v. 82, May 1957, p. 362-367.

Gallates are determined absorptiometrically in a sodium acetate buffer solution with ferrous tartrate. After solution of the fat in light petroleum, propyl gallate is extracted with water and the higher gallates with absolute methanol.

12659* Sodium Carbonate as a Volumetric Standard. W. C. Easterbrook. *Analyst*, v. 82, June 1957, p. 383-390 + 3 plates.

Sodium carbonate prepared by heating sodium sesquicarbonate at 270 C is perfectly stable over long periods at this temperature, and is consistently of high purity.

12660* The Determination of Rubidium and Caesium in Rocks, Minerals and Meteorites by Neutron-Activation Analysis. M. J. Cabell and A. A. Smales. *Analyst*, v. 82, June 1957, p. 390-406.

12661* A 250-Megacycle High-Frequency Titrimeter. E. S. Lane. *Analyst*, v. 82, June 1957, p. 406-415 + 2 plates.

Design and construction; conventional and potential uses.

12662* Polarographic Determinations of Thorium. R. P. Graham and G. B. Larrabee. *Analyst*, v. 82, June 1957, p. 415-422.

Indirect polarographic methods for the determination of Th depend on the precipitation of Th by *m*-nitrobenzoic acid, *m*-nitrophenylarsonic acid, or 8-hydroxyquinoline, dissolution of the separated compound, and then the polarographic determination of the regenerated organic reagent.

12663* The Photometric Determination of Small Amounts of Silicon in Nickel and Nickel Alloys Used in Electronic Devices. T. R. Andrew. *Analyst*, v. 82, June 1957, p. 423-427.

Determinations in Ni alloys containing up to 4% of W. Silicon is determined photometrically at 810 mμ as the blue reduced molybdosilicate.

12664* The Determination of Sorbitol. L. H. Adcock. *Analyst*, v. 82, June 1957, p. 427-434.

Separation of sorbitol from sorbitol-carbohydrate mixtures is effected by degradation of the carbohydrates with alkali, followed by removal of the degradation products by means of ion-exchange resins.

12665* The Analysis of Technical Chlorbenside and Fluorbenside. D. J. Higgons and W. H. Stephenson. *Analyst*, v. 82, June 1957, p. 435-442.

Method is based on the fact that oxidation of the isomeric sulfides in the materials gives a corresponding mixture of isomeric sulfones.

12666* Recommended Methods for the Analysis of Trade Effluents. Methods for the Determination of Aluminium and Zinc. *Analyst*, v. 82, June 1957, p. 443-448.

Detailed description of standard reagents and procedures involved in colorimetric and titrimetric determinations.

12667 Mass Spectrometric Analysis. Aliphatic Aldehydes. J. A. Gilpin and F. W. McLafferty. *Analytical Chemistry*, v. 29, July 1957, p. 990-994.

Spectra showed certain typical cleavages and rearrangements. In most cases the aldehydes gave a major cleavage at the bond β to the aldehyde group, accompanied by the rearrangement of one hydrogen to the oxygen-containing fragment.

12668 Differential Spectrophotometric Determination of Uranium and Niobium. Charles V. Banks, Keith E. Burke, Jerome W. O'Laughlin, and James A. Thompson. *Analytical Chemistry*, v. 29, July 1957, p. 995-998.

12669 Near-Infrared Analysis of N-Alkyl and N-Alkyl-N-Hydroxyalkyl Aromatic Amine Mixtures. Kermit Whetsel, William E. Roberson, and Max W. Krell. *Analytical Chemistry*, v. 29, July 1957, p. 1006-1008.

12670 Quantitative Analyses by Fluorescent X-Ray Spectrography. Determination of Germanium in Coal and Coal Ash. William J. Campbell, Howard F. Carl, and Charles E. White. *Analytical Chemistry*, v. 29, July 1957, p. 1009-1016.

12671 Fluorescent X-Ray Spectroscopic Estimations of Palladium, Platinum, Rhodium, and Iridium. William M. MacNevin and Eero Arnold Hakkila. *Analytical Chemistry*, v. 29, July 1957, p. 1019-1022.

New sample preparation technique involves application of the sample solution to heavy absorbent paper, which after drying is placed directly in the sample holder of the X-ray instrument.

12672 Determination of Normal Paraffins and Normal Olefins in Petroleum Distillates. Kurt H. Nelson, M. D. Grimes, and B. J. Heinrich. *Analytical Chemistry*, v. 29, July 1957, p. 1026-1029.

Method is based on the selective sorption of straight-chain compounds by a synthetic zeolite, Linde Molecular Sieve, Type 5A.

12673 Determination of Small Amounts of Acrylonitrile in Aqueous Industrial Streams. G. W. Daues and W. F. Hamner. *Analytical Chemistry*, v. 29, July 1957, p. 1035-1037.

Method is based on the concentration of acrylonitrile and separation from other components by means of an azeotropic distillation with methanol, coupled with a polarographic analysis.

12674 Enzymatic Method for Estimation of Sarin in Dilute Aqueous Solution. Joseph Epstein, Mary Demek, and Vernon C. Wolff, Jr. *Analytical Chemistry*, v. 29, July 1957, p. 1050-1053.

Method depends upon the inhibition of esteratic enzymes found in horse serum. In the absence of Sarin, these enzymes hydrolyze the substrate 2-azobenzene-1-naphthyl acetate, which is pale yellow in solution, to the deep red 2-azobenzene-1-naphthol.

12675 Particle Size Determination by Radioactivation. Bernard M. Abraham, Howard E. Flotow, and Roger D. Carlson. *Analytical Chemistry*, v. 29, July 1957, p. 1058-1060.

The powder to be analyzed is first activated by neutron bombardment and the resultant activity that radiates from a thin lamina of suspension is used as a measure of the weight of material in the lamina.

12676 High-Frequency Determination of Ferromagnetic Metals. Francis J. Schmidt. *Analytical Chemistry*, v. 29, July 1957, p. 1060-1062.

Method is based on permeability measurements at high frequencies and is suitable for the determination of Fe, Ni, or Co, when only one of these metals is present as a major constituent.

12677 Differentiating Titration of Acid Mixtures in Acetone. James S. Fritz and Stanley S. Yamamura. *Analytical Chemistry*, v. 29, July 1957, p. 1079-1084.

Titrations can be followed potentiometrically using a glass-modified calomel electrode system. In general a differentiating titration is feasible if the potential at the start of the inflection of the stronger acid and the potential at the beginning of the curve of the weaker acid differ by more than 100 mv.

12678 Dumas Microdetermination of Nitrogen. Wolfgang J. Kirsten. *Analytical Chemistry*, v. 29, July 1957, p. 1084-1089.

Procedure is based upon pyrolysis in Co_2 and subsequent combustion over Ni_3O_4.

12679 Microdetermination of Heavy Elements Such as Mercury and Iodine, in Solution, by X-Ray Absorption. Jean Leroux, Patricia A. Maffett, and J. L. Monkman. *Analytical Chemistry*, v. 29, July 1957, p. 1089-1092.

By careful selection of the absorption cell and radiation, a fraction of a μg. can be determined in a sample volume of less than 1 μl. Sensitivity can be predicted from a simple empirical equation.

12680 Colorimetric Determination of Microgram Amounts of Tungsten in Uranium-Tantalum-Tungsten Alloys. Clark E. Bricker and Glenn R. Waterbury. *Analytical Chemistry*, v. 29, July 1957, p. 1093-1095.

12681 Reduction of Aqueous Iodine by Trace Impurities. John H. Wolfenden. *Analytical Chemistry*, v. 29, July 1957, p. 1098-1100.

The slow development of triiodide ions in aqueous solutions of I is due mainly to the presence of almost inevitable traces of dust and not to the slow hydrolysis to HIO_3. Unless this effect is taken into account, the use of ultra-violet absorbance to measure very small concentrations of triiodide ion may be in error. Radiochemical and electrometric measurements with very dilute solutions of I may also be effected.

12682 Spectrophotometric Determination of Boron in High-Temperature Alloys by Quinalizarin Method. A. H. Jones. *Analytical Chemistry*, v. 29, July 1957, p. 1101-1105.

12683 Characteristics of Boron-Benzoin Complex. Improved Fluorometric Determination of Boron. Charles E. White and Donald E. Hoffman. *Analytical Chemistry*, v. 29, July 1957, p. 1105-1108.

The complex is stabilized at its maximum intensity for a 20-minute period with glycine buffer and for a somewhat longer time with isopropylamine.

12684* Paper Chromatography of the Tetracycline Antibiotics and Their Epimers. George B. Selzer and William W. Wright. *Antibiotics & Chemotherapy*, v. 7, June 1957, p. 292-296.

12685* (English.) **Determination of Amino Acids as Phenyl Thiohydantoin Derivatives. I. Micro Synthesis of 3-Phenyl-2-Thiohydantoins From Amino Acids. II. Chromatographic Separation of 3-Phenyl-2-Thiohydantoins of Amino Acids.** John Sjöquist. *Arkiv för Kemi*, v. 11, no. 2, 1957, p. 129 + 17 pages.

12686* The Separation of Permissible Food Dyes by Two-Dimensional Chromatography and Electrophoresis on Paper. J. R. A. Anderson, L. C. Lock, and E. C. Martin. *Australian Journal of Applied Science*, v. 8, June 1957, p. 112-119.

12687 Quantitative Determination of Amino Acids by Paper Chromatography. Clark A. Porter, David Margolis, and Pamela Sharp. *Boyce Thompson Institute, Contributions*, v. 18, Apr.-June 1957, p. 465-476.

Compounds are reacted on the paper with a ninhydrin solution containing 8-hydroxyquinoline in an ethanol-saturated atmosphere at 60 C for 30 min.

12688 Spectroanalysis of Steel for Oxygen. O. B. Fal'kova. *Henry Brutcher Translation No.* 3884, 3 p. (From *Izvestiia Akademii Nauk SSSR, Ser. Fiz.*, v. 19, no. 2, 1955, p. 149-150.) Henry Brutcher, Altadena, Calif.

12689 Spectrochemical Determination of Nitrogen, Hydrogen, and Oxygen in Titanium and Titanium Alloys. N. S. Sventitskii, K. A. Sukhenko, P. P. Galonov, O. B. Fal'kova, M. S. Alpatov, and K. I. Taganov. *Henry Brutcher Translation No.* 3899, 10 p. (From *Zavodskaya Laboratoriya*, v. 22, no. 6, 1956, p. 668-673.) Henry Brutcher, Altadena, Calif.

Previously abstracted from original. See item 12202, v. 5, Oct. 1956.

12690 Ion-Exchange Methods for the Quantitative Separation of the Alkaline Earths, and Their Application to the Determination of Sr^{90} in Milk Ash. Gwen M. Milton and W. E. Grummitt. *Canadian Journal of Chemistry*, v. 35, June 1957, p. 541-551.

12691 Paper Chromatography in Insect Taxonomy. J. G. Robertson. *Canadian Journal of Zoology*, v. 35, June 1957, p. 411-419.

Seventeen species of Coleoptera, Lepidoptera, Diptera, and Hymenoptera showed chemical differences.

12692 Some Factors Which Might Affect the Accuracy of the Iodometric Estimation of Penicillin. J. E. Banfield. *Chemical Society, Journal*, June 1957, p. 2578-2581.

Iodide concentration is important.

12693* (French.) X-Ray Emission Spectra of Rare Earths. **Spectres d'émission X des terres rares.** Jean Blandin and Jean Rose. *Comptes Rendus*, v. 244, May 13, 1957, p. 2497-2499.

Description of spectrographic method of X-ray analysis of Se and rare earths. Simultaneous recording of the clearest lines of Y and of the lanthanides. This is a more sensitive method than are spectrography.

12694 Microsampling Method of Determining Gases and Vapors, Particularly Halogenated Hydrocarbons, in Air. F. Call. *Journal of Applied Chemistry*, v. 7, May 1957, p. 210-215.

Apparatus withdraws an accurately measured 1-2 ml. sample of air and passes it first through a silica combustion tube and then through a reagent solution where the combustion products produce a color change capable of being accurately measured. Procedure takes two min.

12695* Separation of Adrenaline, Noradrenaline, and Hydroxytyramine by Ion Exchange Chromatography. Norman Kirshner and McC. Goodall. *Journal of Biological Chemistry*, v. 226, May 1957, p. 207-212.

Amberlite IRC-50 is used.

12696 Paper Chromatography of the False Pyrethrins. H. C. Hodgson. *Journal of the Science of Food and Agriculture*, v. 8, June 1957, p. 347-350.

Shows that appreciable differences in false pyrethrin II content can occur between varieties of pyrethrum flowers.

12697 Colorimetric Determination of *p*-Chlorobenzyl *p*-Chlorophenyl Sulphide as a Spray Residue. H. J. Hardon, H. Brunink, and E. W. Van der Pol. *Journal of the Science of Food and Agriculture*, v. 8, June 1957, p. 368-370.

12698* (English.) **The Infrared Absorption Rosin Acids and Their Derivatives. II. Podocarpic Acid and the γ-Lactone of Hydroxytetrahydroabietic Acid.** Henrik H. Bruun. *Paperi ja Puu*, v. 39, no. 4, 1957, p. 221-227.

12699 Analytical Control Laboratory Operating Manual. M. J. Painter and G. A. Huff. *Phillips Petroleum Co., Idaho Operations Office (U. S. Atomic Energy Commission)*, IDO-14396, Mar. 1957, sections individually paged. (UF767 Un3.1id Contin.)

Theory and operation of apparatus and instruments used in the laboratory.

12700 Remote Determination of Fluoride in Zirconium-Uranium Fuel Processing Solutions. Fred W. Dykes, Glenn L. Booman, Maxine C. Elliott, and James E. Rein. *Phillips Petroleum Co., Idaho Operations Office (U. S. Atomic Energy Commission)*, IDO-14405, Mar. 1957, 13 p. (UF767 Un3.1id Contin.)

Fluoride is separated by pyrohydrolysis in Ni combustion apparatus. The evolved HF is then titrated with standard $Th(NO_3)_4$ to a conductometric end point.

12701* Vapor Phase Chromatography. Ralph H. Munch. *Record of Chemical Progress*, v. 18, no. 2, 1957, p. 69-101.

Apparatus, procedures, and capabilities.

12702* (French.) Contribution to the Quantitative Spectral Analysis of Silicates. **Contribution a l'analyse spectrographique quantitative des silicates.** I. A. Voinovitch, J. Vilnat, and J. Debras. *Société Française de Céramique, Bulletin No.* 35, Apr.-June 1957, p. 115-125.

A comparison between the traditional chemical analysis, and the quantitative spectral analysis, of SiO_2 and Al_2O_3 in some silico-aluminous substances such as clays, feldspars, and refractories.

12703 Identification of Micro-Constituents in Steels. J. R. Maurer, A. E. Glubish, and A. J. Lena. *Steel Horizons*, v. 19, 3rd quarter, 1957, 4 p.

An electrolytic method for the extraction of intermetallic compounds; a chemical dissolution method employing Br for the extraction of inclusions.

12704* Critical Discussion on the Analytical Methods for Mercaptan and Sulphur Compounds. Pietro Colombo, Davide Corbetta, Alessandro Pirotta, and Alberto Sartori. *Tappi*, v. 40, June 1957, p. 490-498.

12705* (Russian.) Determination of Oxygen in Metals and Oxides With the Aid of Sulfur Monochloride. **Opredelenie kisloroda v metallakh i okislakh s pomoshch'iu odnokhloristoi sery. II.** Determination of Oxygen in Zirconium and Boron Oxides and Reaction of Sulfur Monochloride With Different Materials. **Opredelenie kisloroda v okislakh tsirkoniia i bora i vzaimodeistvie odnokhloristoi sery s razlichnymi veschestvami.** K. S. Kleiner and L. V. Markova. *Ukrainskii Khimicheskii Zhurnal*, v. 23, no. 2, 1957, p. 236-238.

Experimental data show that O can be determined in ZrO_2 and B_2O_3 by treating test samples with S_2Cl_2 vapor in a stream of N at 900 C.

12706* (Russian.) Determination of Tantalum in Titanium Alloys by Means of Spectrophotometry in the Ultra-Violet. **Opredelenie tantala v titanovykh splavakh spektrofotometricheskim putem v ul'trafiolete.** B. M. Dobkina and E. I. Petrova. *Zavodskaia Laboratoriia*, v. 23, Apr. 1957, p. 421-422.

Determination of Ta in Ti alloys by decreasing the influence of Ti is achieved by means of a reaction in HCl medium and by taking readings in the ultra-violet phase of spectrum. The preparation of the standard solution of Ta, measurement of absorptive index, and the process of analysis are described.

12707* (English.) **Oxidative Determination of Thiosulphate by Alkaline Ferricyanide Using Osmium Tetroxide as a Catalyst.** G. S. Deshmukh and M. G. Bapat. *Zeitschrift für Analytische Chemie*, v. 156, no. 2, 1957, p. 105-108.

The high conversion factor, availability of alternate procedures, and use of $K_3Fe(CN)_6$ as a standard oxidant with a high mol.wt. are characteristic features of this redox procedure.

12708* (English.) **Vanadametry. Estimation of Arsenite —Use of Iodine Monochloride and Osmium Tetroxide as Catalysts.** K. Bhaskara Rao, H. S. Gowda, and G. Gopala Rao. *Zeitschrift für Analytische Chemie*, v. 156, no. 3, 1957, p. 180-184.

12709* (English.) **Electro-Migration on Paper in the Separation of Ions. IV-V.** Hari Gopal Mukerjee. *Zeitschrift für Analytische Chemie*, v. 156, no. 3, 1957, p. 184-194.

Migration rates of Pt and Pd ions; their separation from each other and from Hg, Cu, Bi, Cd, Fe, Zn, Ni, and Co using various electrolytes. Migration sequences of ferric, Al, and Be ions; separation of Be from Al and ferric ion from Al, Ag, Pb, Hg, Cu, Cd, Bi, Zn, Co, and Ni in different electrolytes.

12710* (German.) Contribution to the Infrared-Absorption Spectrum of Various Phosphorus Compounds. **Beiträge zur Kenntnis der Ultrarot-Absorptions-spektren verschiedener Phosphorverbindungen. I.** Alkali Orthophosphate. **Alkali-orthophosphate.** A. Mutschin and K. Maennchen. *Zeitschrift für Analytische Chemie*, v. 156, no. 4, 1957, p. 241-248.

Spectra of orthophosphoric acid and its Na salts.

12711* (English.) **Determination of Thorium in Magnesium Alloys That Contain Zirconium.** G. B. Larrabee and R. P. Graham. *Zeitschrift für Analytische Chemie*, v. 156, no. 4, 1957, p. 258-265.

Method depends on the precipitation of Th as the tetra (m-nitrobenzoate) and polarographic determination of the m-nitrobenzoic acid that is equivalent to the amount of Th so precipitated.

12712* (English.) **Determination of Thiourea and Its Methyl Derivatives by Hypoiodite Oxidation, and Iodine Monochloride End Point; Iodine Bromide End Point in the Titration of Thiourea With Iodate.** G. S. Deshmukh and M. G. Bapat. *Zeitschrift für Analytische Chemie*, v. 156, no. 4, 1957, p. 276-280.

12713* (Russian.) Extraction of Uranyl α-Nitroso-β-Naphtholate and Separation of Uranium From Vanadium and Iron. **Ekstraktsiia α-nitrozo-β-naftolata uranila i otdelenie urana ot vanadiia i zheleza.** I. P. Alimarin and Iu. A. Zolotov. *Zhurnal Analiticheskoi Khimii*, v. 12, Mar.-Apr. 1957, p. 176-180.

Hexavalent U is quantitatively extracted from aqueous solutions as α-nitroso-β-naphtholate with organic solvents immiscible with water. It is completely extracted with n-butyl alcohol and ethyl-acetate at pH 3.0 to 8.5 and with isoamyl alcohol at pH 4.5 to 7.5.

12714* (Russian.) Spectral Determination of Uranium in Ores and Refined Products. **Spektral'noe opredelenie urana v rudakh i produktakh ikh pererabotki.** N. G. Morozova. *Zhurnal Analiticheskoi Khimii*, v. 12, Mar.-Apr. 1957, p. 185-192.

Methods for the determination of U in the d.c. arc with Cu electrodes. Sensitivity of detection is improved by pressing or melting the samples before analysis.

12715* (Russian.) The Application of β-Furfuraldoxime for the Determination of Large Amounts of Palladium in the Presence of Copper and Nickel. **Primenenie β-furfural'doksima dlia opredeleniia bol'shikh kolichestv palladiia v prisutstvii medi i nikelia.** N. K. Pshenitsyn and G. A. Nekrasova. *Zhurnal Analiticheskoi Khimii*, v. 12, Mar.-Apr. 1957, p. 205-207.

12716* (Russian.) On the Sensitivity of the Detection of Magnesium Ion by Means of Iodine. **K voprosu o chuvstvitel'nosti otkrytiia iona magniia pri pomoshchi ioda.** A. S. Babenko. *Zhurnal Analiticheskoi Khimii*, v. 12, Mar.-Apr. 1957, p. 220-223.

The influence of Ca^{2+}, Sr^{2+}, Ba^{2+}, K^+, Na^+, and NH_4^+ ions on the sensitivity of the detection of Mg ion by means of iodine, magnezon, and quinalizarin was studied.

12717* (Russian.) Potentiometric Determination of Small Quantities of Barium in Nickel-Base Alloys With the Application of Complexone III. **Potentsiometricheskii method opredeleniia malykh kolichestv bariia v splavakh na nikelevoi osnove s primeneniem kompleksona III.** L. Ia. Polyak. *Zhurnal Analiticheskoi Khimii*, v. 12, Mar.-Apr. 1957, p. 224-229.

Method permits determining more than 0.05% Ba in the presence of Ca in multi-component alloys.

12718* (Russian.) Determination of Ammonia and Volatile Aliphatic Amines by an Indirect Polarographic Method. **Opredelenie ammiaka i letuchikh alifaticheskikh aminov kosvennym poliarograficheskim metodom.** R. Pletikha and V. Stefan. *Zhurnal Analiticheskoi Khimii*, v. 12, Mar.-Apr. 1957, p. 252-258.

Method is based on precipitation with Nessler's reagent and polarographic determination of Hg in a resulting precipitate after dissolving it with $Na_2S_2O_3$.

See also: **12525** (microbiological determination of vitamins and amino acids); **12616** (electrophoresis columns); **13231** (oxygen analyzers); **13258** (geochemical prospecting); **13486** (determination of oxygen in cast-iron); **13503** (analysis of foundry heats); **13976** (analysis of welds).

CHEMISTRY—INORGANIC AND GENERAL

12719 Reaction of Mercury(II) With Halides in Glacial Acetic Acid. Orland W. Kolling. *American Chemical Society, Journal*, v. 79, June 5, 1957, p. 2717-2719.

The stoichiometry of the reaction was determined by potentiometric titrations.

12720 The Molecular Structure of $B_{10}H_{12}I_2$. Riley Schaeffer. *American Chemical Society, Journal*, v. 79, June 5, 1957, p. 2726-2728.

Structure was determined by X-ray diffraction techniques.

12721 Tridentate Chelate Compounds. I. Francis Lions and Kenneth V. Martin. *American Chemical Society, Journal*, v. 79, June 5, 1957, p. 2733-2738.

New compounds containing three donor nitrogen atoms are reported.

12722 The System Ammonia-Hydrazine-Ammonium Chloride. Forrest R. Hurley and Harry H. Sisler. *American Chemical Society, Journal*, v. 79, June 20, 1957, p. 2999-3003.

Studies were restricted to that portion of the general diagram enclosed in the triangle NH_3-N_2H_4-NH_4Cl, and to pressures near one atmosphere. A ternary compound believed to be $NH_3 \cdot HCl \cdot N_2H_4$, but whose composition has not been established, melts incongruently at −2.5 C. The conditions for removal of ammonium chloride from the system by crystallization are outlined.

12723 Ion-Exchange Studies of Solutions of Arsenites. D. A. Everest and W. J. Popiel. *Chemical Society, Journal*, June 1957, p. 2433-2436.

The sorption of As and of Chloride by Amberlite I.R.A.-400 (Cl) from arsenious acid solutions was studied over the pH range 5-13.

12724* (German.) Potassium Tetraphenylborate Regeneration. **Die Regeneration von Kaliumtetraphenylborat.** Harald Reimers. *Chemiker-Zeitung*, v. 81, June 5, 1957, p. 357-359.

Method of regeneration of potassium tetraphenyloborate, to obtain its valuable Na-salt, by means of cation exchange in a highly acid medium.

12725* (French.) Foams as a Separating and Fractionating Medium. **Séparations et fractionnements par moussage.** Marcel Abribat. *Chimie Analytique*, v. 39, June 1957, p. 217-223.

Use of foams for separating and fractionating purposes has many scientific and industrial applications. Methods and apparatus are described.

12726 Comprehensive Inorganic Chemistry. John F. Suttle and Robert C. Brasted. v. VI. 234 p. 1957. D. Van Nostrand Co., New York. (QD151 C73)

Occurrence; chemical properties and uses; isotopes; preparation; compounds.

12727* (Russian.) Lanthanum Sulfides. **O sul'fidakh lantana.** N. P. Zvereva. *Doklady Akademii Nauk SSSR*, v. 113, no. 2, Mar. 11, 1957, p. 333-334.

Preparation of LaS and determination of its physical-chemical characteristics.

12728* (Russian.) On the Formation of Crystalline Alumosilicates. **Ob obrazovanii kristallicheskikh aliumosilikatov.** Z. Ia. Berestneva, M. B. Konstantinopol'skaia, and V. A. Kargin. *Kolloidnyi Zhurnal*, v. 19, no. 2, 1957, p. 138-141 + 1 plate.

Crystalline alumosilicates were synthesized in a five chamber electrodialyzer and from dilute aqueous solutions of $Al(NO_3)_3$ and Na_2SiO_3 at elevated temperatures. Both types gave identical electron-microscopic pictures.

12729 Mercury and Its Compounds. *New York Academy of Sciences, Annals*, v. 65, Apr. 1957, p. 357-651. (Q11 N49a Contin.)

A series of papers on various aspects of the physics and chemistry of Hg, its pharmacology and toxicology, and applications in clinical medicine.

12730 General Information Concerning Hydroxides. Mary E. Lee. *Oak Ridge National Laboratory (U. S. Atomic Energy Commission)*, ORNL-1291, Apr. 1952, 269 p. (UF767 U3o Contin.)

A compilation of abstracts, taken from *Chemical Abstracts*, containing information on the hydroxides of Ba, Ca, Ce, Li, Mg, K, Rb, Na, and Sr.

See also: **13296** (chemical documentation); **13539** (Cr compounds).

CHEMISTRY—ORGANIC

12731* (English.) **The Acid-Catalyzed Solvolysis of Alkoxymethyl Esters. III. Reaction Rates and Products in the Solvolysis of Ethoxymethyl Acetate in Ethanol-Water Mixtures. IV. The Temperature Dependence of the Hydrolysis Rate.** Pentti Salomaa. *Acta Chemica Scandinavica*, v. 11 no. 2, 1957, p. 235-246.

12732* (Ukranian.) Study of Oxidation of Methanol Into Formaldehyde on the Silver Catalyst, Using the Method of "Hardening". **Vivchennia okislennia metanolu v formaldegid na sribnomu katalizatori z zastosuvanniam "gartuvannia".** P. M. Stadnik and M. I. Golovei. *Akademiia Nauk Ukrains'koi RSR Dopovidi*, no. 6, 1956, p. 548-550.

Yield of formaldehyde was much higher when this method was used. Increase in temperature did not affect the yield.

12733 Vinyl Derivatives of the Metals. IV. The Preparation of Vinylgermanium Compounds by the Grignard Method. Dietmar Seyferth. *American Chemical Society, Journal*, v. 79, June 5, 1957, p. 2738-2740.

Work is done in a tetrahydrofuran solution. Halide cleavage of hexavinyldigermane is described.

12734 The Dipole Moment of Bis-(*p*-Chlorophenylcyclopentadienyl)-Iron. Dorothy A. Semenow and John D. Roberts. *American Chemical Society, Journal*, v. 79, June 5, 1957, p. 2741-2742.

Indicates a molecular configuration where the *p*-chlorophenyl groups are in rather close proximity.

12735 Studies in the Ferrocene Series. I. Some Reactions of Compounds Related to Monobenzoylferrocene. Norman Weliky and Edwin S. Gould. *American Chemical Society, Journal*, v. 79, June 5, 1957, p. 2742-2746.

Compounds are prepared by Friedel-Crafts acylations.

12736 Organic Chemistry of Ferrocene. I. The Acetylation of Dialkylferrocenes. Kenneth L. Rinehart, Jr., Kaye L. Motz, and Sung Moon. *American Chemical Society, Journal*, v. 79, June 5, 1957, p. 2749-2754.

12737 Substituent Effects on Naphthalene. Association Constants of Substituted Naphthalene-Picric Acid Complexes. Pete D. Gardner and Warren E. Stump. *American Chemical Society, Journal*, v. 79, June 5, 1957, p. 2759-2762.

Twenty-five systematically substituted naphthalenes have been examined.

12738 Formation of the Silicon-Hydrogen Bond by the Reducing Action of Certain Sterically Hindered Grignard Reagents on Phenyltrichlorosilane. Mack C. Harvey, William H. Nebergall, and John S. Peake. *American Chemical Society, Journal*, v. 79, June 5, 1957, p. 2762-2764.

Dialkylphenylsilanes and unsaturated hydrocarbons are formed.

12739 Aliphatic Organo-Functional Siloxanes. V. Synthesis of Monomers by Platinum-Catalyzed Addition of Methyldichlorosilane to Unsaturated Esters and Nitriles. L. H. Sommer, F. P. MacKay, O. W. Steward, and P. G. Campbell. *American Chemical Society, Journal*, v. 79, June 5, 1957, p. 2764-2769.

This is an extension of G. H. Wagner's work which involves platinum-catalyzed addition of silicon-hydrides to olefins.

12740 Pyrimidine Nucleosides. II. The Synthesis of 1-β-*D*-Arabinofuranosylthymine ("Spongothymidine"). Jack J. Fox, Naishun Yung, and Aaron Bendich. *American Chemical Society, Journal*, v. 79, June 5, 1957, p. 2775-2778.

12741 Analogs of Nucleotides. II. Phosphonate Esters of Ribose and Glucopyranosyl Purine Derivatives. Jekishan R. Parikh, Manfred E. Wolff, and Alfred Burger. *American Chemical Society, Journal*, v. 79, June 5, 1957, p. 2778-2781.

12742 Pyridylethylated Benzoxazinediones. Seymour L. Shapiro, Ira M. Rose, and Louis Freedman. *American Chemical Society, Journal*, v. 79, June 5, 1957, p. 2811-2814.

Pyridylethylated products from phenobarbital, saccharin, succinimide, and theophylline are described.

12743 The Reaction of Substituted Indoles With Methyl Vinyl Ketone. New Synthesis of 2-Methylcarbazole. J. Szmuszkovicz. *American Chemical Society, Journal*, v. 79, June 5, 1957, p. 2819-2821.

The reactions of indole, 2-methylindole, and skatole products were investigated.

12744 The Mechanisms of Permanganate Oxidation. IV. Hydroxylation of Olefins and Related Reactions. Kenneth B. Wiberg and Klaus A. Saegebarth. *American Chemical Society, Journal*, v. 79, June 5, 1957, p. 2822-2824.

A new type of reaction, cleavage to a dialdehyde, by the reaction of bicyclo [2.2.1]-2-heptene with permanganate, is reported.

12745 Synthetic Hypotensive Agents. V. 4-(2'-Aminoethyl)-Piperidine Derivatives. Arthur P. Phillips. *American Chemical Society, Journal*, v. 79, June 5, 1957, p. 2836-2838.

These piperidines were prepared for testing for hypotensive ganglionic blocking activity.

12746 Studies of the Reversible Epimerization Occurring in the Tetracycline Family. The Preparation, Properties, and Proof of Structure of Some 4-*epi*-Tetracyclines. J. R. D. McCormick, *et al. American Chemical Society, Journal*, v. 79, June 5, 1957, p. 2849-2858.

12747 Studies in Stereochemistry. XXVI. Solvolytic Rearrangements in the 1,2-Diphenyl-2-Methyl-1-Butanol System. Donald J. Cram and Janet Allinger. **XXVII. Conformational Control of the Migrating Group in the Deamination of 3-Phenyl-2-Butylamine.** Donald J. Cram and John E. McCarty. **XXVIII. Reactivity Differences Between Diastereomers in the Wagner-Meerwein Rearrangement.** Donald J. Cram, H. Leroy Nyquist, and Fathy Ahmed Abd Elhafez. *American Chemical Society, Journal*, v. 79, June 5, 1957, p. 2858-2888.

12748 Stereochemistry of the Primary Carbon. VI. The Reaction of Optically Active 1-Aminobutane-1-*d* With Nitrous Acid. Mechanism of the Amine-Nitrous Acid Reaction. VII. The Decomposition of N-(1-Butyl-1-*d*)-N-Nitrosoacetamide. A. Streitwieser, Jr. and W. D. Schaeffer. *American Chemical Society, Journal*, v. 79, June 5, 1957, p. 2888-2897.

12749 Synthesis of 4-Methylated Steroids. Franz Sondheimer and Yehuda Mazur. *American Chemical Society, Journal*, v. 79, June 5, 1957, p. 2906-2910.

Two synthetic methods are evaluated.

12750 The Synthesis of β-(3-Methoxy-2,6-Dinitrophenyl)-D,L-Alanine and β-(3-Methoxy-4,6-Dinitrophenyl)-D,L-Alanine. Proof of the Structures of Two Isomeric Dinitro-*m*-Tyrosines. Ernest L. Jackson. *American Chemical Society, Journal*, v. 79, June 5, 1957, p. 2912-2915.

12751 Azomethine Dyes. II. Color and Constitution of Acylacetamide Azomethine Dyes. G. H. Brown, et al. *American Chemical Society, Journal*, v. 79, June 5, 1957, p. 2919-2927.

The synthesis and properties of a number of dyes are reported.

12752 The Bromodesulfonation of Aromatic Sulfonate Salts. I. Sodium 3,5-Dibromo-4-Hydroxybenzenesulfonate. II. The Effect of Amino, Methoxy, Methyl, and Nitro Substituents. Lawrence G. Cannell. *American Chemical Society, Journal*, v. 79, June 5, 1957, p. 2927-2941.

12753 The Mechanism of the Sandmeyer and Meerwein Reactions. Jay K. Kochi. *American Chemical Society, Journal,* v. 79, June 5, 1957, p. 2942-2948.

Products were obtained from sources other than arenediazonium salts.

12754 Metal Chelate Compounds as Catalysts in the Hydrolysis of Isopropyl Methylphosphonofluoridate and Diisopropylphosphorofluoridate. R. C. Courtney, R. L. Gustafson, S. J. Westerback, H. Hyytiainen, S. C. Chaberek, Jr., and A. E. Martell. *American Chemical Society, Journal,* v. 79, June 20, 1957, p. 3030-3036.

The rates of hydrolysis of Sarin and DFP were studied in the presence of a wide variety of metal chelate compounds as catalysts. The metal ion which yielded the largest number of catalytic metal chelates was found to be Cu(II), while a number of metal chelates of UO_2(VI), ZrO(IV), Th(IV) and MoO_3(VI) were also found to have considerable activity.

12755 Diacyl Peroxide Reactions. II. The Reaction of δ-Phenylvaleryl Peroxide With Carbon Tetrachloride. III. The Behavior of the Optically Active 3-Phenyl-2-Propyl Free Radical. DeLos F. DeTar and Claus Weis. *American Chemical Society, Journal,* v. 79, June 20, 1957, p. 3041-3049.

12756 The Mechanisms of Permanganate Oxidation. III. The Oxidation of Benzyhydrol. Ross Stewart. *American Chemical Society, Journal,* v. 79, June 20, 1957, p. 3057-3061.

The permanganate oxidation of benzhydrol was studied in an attempt to elucidate the reaction mechanism. The reaction kinetics, the existence of hydroxyl ion catalysis, the presence of a positive salt effect, and the sign and magnitude of the entropy of activation all indicate that the rate-controlling step consists of a reaction between benzhydrylate ion and permanganate ion.

12757 π-Complexes of the Transition Metals. I. Hein's Polyaromatic Chromium Compounds. Harold H. Zeiss and Minoru Tsutsui. *American Chemical Society, Journal,* v. 79, June 20, 1957, p. 3062-3066.

The essential steps of Hein's methods for the preparation of polyphenyl chromium compounds were reproduced. The products of the chemical reduction of these compounds led to a reformulation of their structures in terms of a bisarene cation.

12758 The Mechanism of Fluorination. III. Fluorine Atom Reactions. The Olefin Dimerization Reaction. William T. Miller, Jr. and Stanley D. Koch, Jr. *American Chemical Society, Journal,* v. 79, June 20, 1957, p. 3084-3089.

A general mechanism is presented for the reactions of elemental fluorine with perhalo-olefins. This mechanism accounts for the formation of dimer addition products by the diffusion-controlled combination of free radicals which are produced in pairs with the intermediate formation of fluorine atoms.

12759 Polyalkylene Disulfides. C. S. Marvel and L. Elmer Olson. *American Chemical Society, Journal,* v. 79, June 20, 1957, p. 3089-3091.

The oxidation of alkylene dimercaptans by air in soap emulsion was found to be a useful method of producing polyalkylene disulfides.

12760 Allylic Chlorides. XXIV. 1,1,3-Trichloro-1-Propene, 1,1-Dibromo-3-Chloro-1-Propene and Related Compounds. Lewis F. Hatch and Stanley D. Zimmerman. *American Chemical Society, Journal,* v. 79, June 20, 1957, p. 3091-3093.

These compounds were prepared by conversion of the dihalopropenes to the corresponding allylic bromides using N-bromosuccinimide, basic hydrolysis of the bromides to the allylic alcohols and treatment of the alcohols with phosphorus trichloride.

12761 Neighboring Carbon and Hydrogen. XXVII. Ar_1-5 Aryl Participation and Tetralin Formation in Solvolysis. XXVIII. Ar_2-6 Participation in Solvolysis of Some ω-Aryl-1-alkyl Bromobenzenesulfonates. Richard Heck and S. Winstein. *American Chemical Society, Journal,* v. 79, June 20, 1957, p. 3105-3118.

12762 Ozonolyses of 1,2-Dibenzoylpropene and 1,2-Dibenzoylethylene. Markownikoff's Rule and the Initial Attack of Ozone on an Unsaturated System. Philip S. Bailey and Sheaffers S. Bath. *American Chemical Society, Journal,* v. 79, June 20, 1957, p. 3120-3124.

The ozonolysis of 1,2-dibenzoylpropene in methanol furnishes direct evidence for the specificity previously noted in the attack of ozone on unsymmetrical olefins. The products were phenylglyoxal and α-hydroperoxy-α-methoxypropiophenone.

12763 Cyclic Dienes. XX. 4-*n*-Octyl-1,2-Dimethylenecyclohexane. William J. Bailey and William A. Klein. *American Chemical Society, Journal,* v. 79, June 20, 1957, p. 3124-3127.

A convenient synthesis of a 2-alkyl-1,3-butadiene was developed from a commercially available alkenylsuccinic anhydride as the starting material.

12764 The Beckmann Rearrangement in Liquid Sulfur Dioxide. II. Rearrangement by Halogen. Niichiro Tokura, Ryuzo Asami, and Ritsuro Tada. *American Chemical Society, Journal,* v. 79, June 20, 1957, p. 3135-3137.

The Beckmann rearrangement of ketoximes may be effected by bromine and iodine in liquid sulfur dioxide at room temperature. Chlorine and sulfuryl chloride are without effect, but the addition of (0.02:1 mole ratio) to these reagents lead to rearrangement.

12765 Alkylation of Diphenylmethane With Alkyl Halides by Sodium Amide. Substitution *versus* β-Elimination. Relative Acidities of Diphenylmethane and Ammonia. Charles R. Hauser and Phillip J. Hamrick, Jr. *American Chemical Society, Journal,* v. 79, June 20, 1957, p. 3142-3145.

12766 Reactions of Amines. II. Degradation via Tertiary Amine Oxides. Henry E. Baumgarten, Frank A. Bower, and Ted T. Okamoto. *American Chemical Society, Journal,* v. 79, June 20, 1957, p. 3145-3149.

Degradative sequences for amines derived from acids related to the naphthenic acids are described that include as an important step the pyrolysis of a *t*-amine N-oxide.

12767 Tetrachloroisoindolines and Related Systems. Alkylation Reactions and Inductive Effects. William E. Rosen, Virginia P. Toohey, and Anthony C. Shabica. *American Chemical Society, Journal,* v. 79, June 20, 1957, p. 3167-3174.

The basicity of an isoindoline nitrogen atom is profoundly affected by inductive factors. Four chlorine atoms on the four available positions of the benzene ring or a positively charged nitrogen atom β to the isoindoline nitrogen decrease the reactivity of the isoindoline nitrogen toward alkylation.

12768 Report of the Literature Review Committee. 23rd Annual Review of the Literature on Fats, Oils, and Detergents. II. M. M. Piskur. *American Oil Chemists' Society, Journal,* v. 34, June 1957, p. 264-293.

A comprehensive review of the literature on detergents nutrition and biochemistry, and characteristics and composition of fats and oils.

12769* Amine Derivatives of Cyanuric Chloride. III. Piperazines and Ethylenediamines. William O. Foye and Lester Chafetz. *American Pharmaceutical Association, Journal (Scientific Ed.),* v. 46, June 1957, p. 366-370.

A series of basically-substituted *s*-triazines was prepared by condensing cyanuric chloride and 2,4-diamino-6-chloro-*s*-triazine with monoethoxycarbonyl and monoalkyl piperzines and ethylenediamines. Ultra-violet absorption spectra were used in characterizing the substituted *s*-triazine salts which gave erratic results on elemental analyses.

12770* Some Thyroxine Analogs. I. Substituted *beta*-Phenylserines and Related Substances. Robert Friedenberg and W. Lewis Nobles. *American Pharmaceutical Association, Journal (Scientific Ed.),* v. 46, June 1957, p. 387-389.

3,5-Diiodo-4-(4'-methoxyphenoxy) - derivatives of benzonitrile (m.p. 165-166 C), benzaldehyde (m.p. 119-120 C) phenylserine (m.p. 165-166 C) and the 3,5-diiodo-4-(4'-hydroxyphenoxy *beta*-phenylserine derivative (m.p. 160 C) were prepared.

12771* (German.) New Contributions to the Chemistry of Medium-Number Rings. **Neuere Beiträge zur Chemie mittlerer Ringe.** Rolf Huisgen. *Angewandte Chemie,* v. 69, June 7, 1957, p. 341-359.

Rings containing 8 to 12 members were studied.

12772* (German.) The Synthesis of Fatty Acids by Means of Purified Enzymes of the Aliphatic Series. **Die Syntheses der Fettsäuren mit gereinigten Enzymen des Fettsäurecyclus.**

W. Seubert, G. Greull, and F. Lynen. *Angewandte Chemie*, v. 69, June 7, 1957, p. 359-361.

12773* (German.) Peptide Syntheses. **Peptid-Synthesen. III.** Theodor Wieland and Bärbel Heinke. *Angewandte Chemie*, v. 69, June 7, 1957, p. 362-371.

A review of recent developments in synthesis of complex oligopeptides, cyclopeptides, and polypeptides.

12774* (German.) Lactone Acetales, a New Class of Carboxyl Derivatives. **Lactonacetale, eine neue Klasse von Carbonsäure-Derivaten.** Richard Kuhn and D. Weiser. *Angewandte Chemie*, v. 69, June 7, 1957, p. 371-376.

Preparation and properties.

12775* (German.) Reaction of Diazomethane With Boron Trifluoride in the Gas Phase. **Die Reaktion von Diazomethan mit Bortrifluorid in der Gasphase.** Josef Goubeau and K. H. Rohwedder. *Annales der Chemie*, v. 604, May 1957, p. 168-191.

Reaction between diazomethane and a large excess of boron trifluoride in the gas phase under low pressure and at −40 C results in formation of fluoromethyleneborodifluoride (m.p. −47 C, b.p. +7 C) with a formula F_2BCH_2F.

12776* (English.) **6-Benzylmercaptomthyl-3-(2H)-Pyridazinone.** Göran Claeson. *Arkiv för Kemi*, v. 11, no. 3, 1957, p. 285-289.

Preparation and characteristics.

12777 Some Aralkyl and Aryl Alkyl Sulphides and Disulphides. Marshall Kulka and F. G. Van Stryk. *Canadian Journal of Chemistry*, v. 35, June 1957, p. 519-526.

Sixty sulfides and disulfides were prepared from mercaptans and alkyl and alkylene halides for testing as insecticides.

12778 The Attempted Synthesis of Two Hexose Phosphonate Esters. F. C. G. Hoskin. *Canadian Journal of Chemistry*, v. 35, July 1957, p. 581-583.

The synthesis of glucose-1-methylphosphonate and isopropyl glucose-1-methylphosphonate was attempted. Although the intermediates were successfully prepared, deacetylation failed to give the desired products.

12779 Addition of Ethyl Radicals to Ethylene. J. A. Pinder and D. J. Le Roy. *Canadian Journal of Chemistry*, v. 35, July 1957, p. 588-594.

The addition of ethyl radicals to ethylene was studied in the temperature range 58 to 123 C. The radicals were produced by the Hg photosensitized decomposition of H in the presence of ethylene, and the rate of the addition reaction was measured in terms of the rate of formation of *n*-hexane by the combination of ethyl and butyl radicals.

12780 Synthesis in the Field of the Erythrina Alkaloids. I. The Synthesis of Hexahydroapoerysotrine. II. Approaches to the Ring System of β-Erythroidine. B. Belleau. *Canadian Journal of Chemistry*, v. 35, July 1957, p. 651-672.

12781 The Prins Reaction With β,γ-Unsaturated Acids and Amides. B. Belleau. *Canadian Journal of Chemistry*, v. 35, July 1957, p. 673-676.

The acid catalyzed condensation of cyclohexenylacetic acid and its corresponding N-methylamide with formaldehyde was investigated. Good yields of the expected δ-lactone or δ-lactam were obtained when trifluoro-acetic acid was used both as catalyst and solvent for the reaction.

12782 A Synthesis of Porphobilinogen. A. H. Jackson and S. F. MacDonald. *Canadian Journal of Chemistry*, v. 35, July 1957, p. 715-722.

The lactam of 5-carbonxy-porphobilinogen, is easily decarboxylated to porphobilinogen lactam, hydrolysis of which gives porphobilinogen.

12783 The Photoinitiated Addition of Mercaptans to Olefins. III. The Kinetics of the Addition of Thiophenol to Styrene and to 1-Octene. R. H. Pallen and C. Sivertz. *Canadian Journal of Chemistry*, v. 35, July 1957, p. 723-733.

12784 Recent Developments in the Synthesis of Fatty Acids. Walter J. Gensler. *Chemical Reviews*, v. 57, Apr. 1957, p. 191-280.

A comprehensive review of general methods and specific synthesis of various acids.

12785 The Reaction of Monoamines With Chloro-Bridged Complexes of Palladium(II). J. Chatt and L. M. Venanzi. *Chemical Society, Journal*, June 1957, p. 2445-2447.

12786 Degradative Studies on Peptides and Proteins. IV. The Formation of Salts of 2-Acylaminothiazol-5-ones by Acid-Catalysed Degradation of N-Acylthiocarbamoylpeptides and Their Behaviour Towards Nucleophilic Reagents. D. T. Elmore and P. A. Toseland. *Chemical Society, Journal*, June 1957, p. 2460-2466.

Nucleophilic reagents such as water, alcohols, and primary amines open the heterocyclic ring to give *N*-acylthiocarbamoyl-amino-acid derivatives.

12787 Conjugated Macrocycles. XXIX. Tribenzotetrazaporphin Metal Derivatives and Dibromotribenzotetrazaporphin. J. A. Elvidge, J. H. Golden, and R. P. Linstead. *Chemical Society, Journal*, June 1957, p. 2466-2472.

Tribenzotetrazaporphin was converted into the Cu, Ni, and Co derivatives and brominated to dibromotribenzotetrazaporphin (III). Oxidation of the last yields phthalimide and dibromomaleimide. Light absorptions are given.

12788 Carbonyl Complexes of Rhodium. II. Complexes With Triaryl Phosphites. L. Vallarino. *Chemical Society, Journal*, June 1957, p. 2473-2475.

Preparation and properties of complexes $[RhL_2(CO)Cl]$ and $[RhL_3Cl]$, where L = triaryl phosphite. The compounds are monomers, non-electrolytes, and diamagnetic.

12789 The Enzymic Synthesis and Degradation of Starch. XXIII. Structural Requirements of D-Enzyme With Respect to Acceptors. Stanely Peat, W. J. Whelan, and G. Jones. *Chemical Society, Journal*, June 1957, p. 2490-2495.

It is shown by the use of methyl α-D-glucopyranoside as acceptor, that it is the C(4)-hydroxyl group of the acceptor which receives the transferred glycosyl radical. This reaction was used for the preparation of methyl α-maltoside, α-maltotrioside, and α-maltotetraoside.

12790 Olefin Coordination Compounds. IV. Diene Complexes of Platinum(II). The Structure of Hofmann and von Narbutt's [Dicyclopentadiene(RO)PtCl]. J. Chatt, L. M. Vallarino, and L. M. Venanzi. *Chemical Society, Journal*, June 1957, p. 2496-2505.

12791 The Oxidation of Phenylhydrazine. R. L. Hardie and R. H. Tomson. *Chemical Society, Journal*, June 1957, p. 2512-2518.

Oxidation is affected by gradual addition of the equivalent amount of Ag_2O to a solution of phenylhydrazine in an aromatic solvent. Diaryls are also formed by the oxidation of phenylhydrazine with air, and with benzoquinones, in aromatic solvents, and with Ag_2O and $CuSo_4$ in aqueous media.

12792 Electrophilic Substitution. X. Nitration of Quinoxaline. XI. Nitration of Some Six-Membered Nitrogen-Heterocyclic Compounds in Sulphuric Acid. M. J. S. Dewar and P. M. Maitlis. *Chemical Society, Journal*, June 1957, p. 2518-2528.

12793 The Homolytic Addition of Chloroacetone to Olefins. R. L. Huang. *Chemical Society, Journal*, June 1957, p. 2528-2531.

Chloroacetone adds homolytically to dec-1-ene to give 3-chlorotridecan-2-one, whose structure was established by degradation. Addition proceeds less effectively with allylbenzene and ethyl undec-10-enoate, and fails with allylacetone, *cyclo*hexene, and ethyl crotonate. A chain mechanism is proposed.

12794 Ring-Chain Tautomerism in the Acid Esters of Pyridine-2:3-Dicarboxylic Acid. J. Kenyon and Kumar Thaker. *Chemical Society, Journal*, June 1957, p. 2531-2536.

12795 The Alkaloids of the Amaryllidaceae. II. Hoemanthine and a New Alkaloid Distichine From *Boöphone disticha* Herb. Angela N. Bates, J. K. Cooke, L. J. Dry, A. Goosen, H. Krüsi, and F. L. Warren. *Chemical Society, Journal*, June 1957, p. 2537-2540.

The plant extract contains lycorine, haemanthine (now obtained crystalline), and a small quantity of another alkaloid isolated as its picrate, $C_{31}H_{32}O_{11}N_4$, while the principal constituent is a new alkaloid (distichine) $C_{19}H_{21}O_3N$.

12796 Studies in Pyrolysis. X. Model Systems for the Pyrolysis of Poly(Ethylene Terephthalate):2-Hydroxyethyl Benzoate and Related Substances. H. V. R. Iengar and P. D. Ritchie. **XI. Competetive Routes in the Pyrolysis of Esters: Phenyl Acrylate and Phenyl α-Methylacrylate.** H. M. Mackinnon and P. D. Ritchie. *Chemical Society, Journal,* June 1957, p. 2556-2569.

12797 Fluorinated Sulphonic Acids. I. Perfluoro-Methane-, -Octane-, and -Decane-Sulphonic Acids and Their Simple Derivatives. J. Burdon, I. Farazmand, M. Stacey, and J. C. Tatlow. *Chemical Society, Journal,* June 1957, p. 2574-2578.

12798 Oxygen Heterocycles. VIII. Aroylbenzofurans, Aroyldibenzofurans, and Aroylcoumarins of Potential Biological Interest. Ng. Ph. Buu-Hoi, G. Saint-Ruf, T. B. Loc, and Ng. D. Xuong. *Chemical Society, Journal,* June 1957, p. 2593-2596.

12799 Thionaphthencarboxylic Acids. G. M. Badger, D. J. Clark, W. Davies, K. T. H. Farrer, and N. P. Kefford. *Chemical Society, Journal,* June 1957, p. 2624-2630.

All the isomeric thionaphthencarboxylic acids, except thionaphthen-4-carboxylic acid, were synthesized. Most of these syntheses involve intermediate formation of bromothioindoxyls by ring closure from the appropriate *ortho*-substituted (bromophenylthio) acetic acids.

12800 7-Nitro-1-Naphthylamine. II. The Nitration of *N*-Acyl Derivatives and Decompositions of Diazotised 2:4:*x*-Trinitro-1-Naphthylamines. A. Hardy and E. R. Ward. *Chemical Society, Journal* June 1957, p. 2634-2640.

12801 Perfluoroalkyl Derivatives of Sulphur. VI. Perfluoroalkanesulphonic Acids $CF_3 \cdot [CF_2]_n \cdot SO_3H$ (n=1-7). T. Gramstad and R. N. Haszeldine. *Chemical Society, Journal,* June 1957, p. 2640-2645.

Electrolysis of solutions of alkanesulfonyl chlorides $CH_3 \cdot [CH_2]_n \cdot SO_2Cl$ in anhydrous HF gives the perfluoroalkanesulfonyl fluorides $CF_3 \cdot [CF_2]_n \cdot SO_2F$ in 25-80% yield; the fluorides are readily converted into the corresponding sulfonic acids. Certain by-products from the electrolysis of *n*-octanesulfonyl chloride were identified.

12802 Four Higher Annellated Pyrenes With Acene Character. B. Boggiano and E. Clar. *Chemical Society, Journal,* June 1957, p. 2681-2689.

The naphthopentacene was synthesized from naphthalene-2, 3-dicarboxylic anhydride and pyrene, the naphthohexacene from anthraquinone-2,3-dicarboxylic anhydride and pyrene, and the dinaphthoheptacene from pyromellitic anhydride and pyrene.

12803 An Approach to the Partial Synthesis of Aldosterone From Steroids Lacking Substitution at C_{18}. D. H. R. Barton, A. Da. S. Campos-Neves, and A. I. Scott. *Chemical Society, Journal,* June 1957, p. 2698-2706.

3 β-Acetoxyandrostane-11:17-dione was converted, by fission and subsequent reclosure of the 13-17 bond, and by other appropriate manipulations, into 18-benzylidene-3 β-hydroxy-14-*iso*:17-*iso*-*allo*pregnane-11:20-dione. Reduction of the 11-carbonyl group of the latter to 11β-hydroxyl, followed by ozonolytic cleavage of the benzylidene group, affords the masked aldehyde system characteristic of aldosterone.

12804 Bisquaternary Ammonium Salts. III. 4-Alkylbenzene-1:ω-Bistrialkylammonium Salts. J. N. Ashley and W. G. Leeds. *Chemical Society, Journal,* June 1957, p. 2706-2713.

Preparation and properties of twenty 4-alkylbenzene 1:ω-bis (trialkylammonium iodides).

12805 Synthesis of Gentianine. T. R. Govindachari, K. Nagarajan, and S. Rajappa. *Chemical Society, Journal,* June 1957, p. 2725-2726.

Treatment of 4-methyl-5-vinylnicotinic acid with formaldehyde yields gentianine.

12806 The Reaction of Carbonyl Chloride With 1:2-Epoxides. J. Idris Jones. *Chemical Society, Journal,* June 1957, p. 2735-2743.

Carbonyl chloride (1 mole) adds readily to an epoxide (1 mole) with formation of the corresponding 2-chloro-substituted chloroformate. With 2 moles of epoxide and 1 mole of carbonyl chloride the product is the corresponding bis-2-chloroalkyl carbonate. A convenient synthesis of *N*-substituted oxazolid-2-ones was evolved based on the removal of HCl from the mono-*N*-substituted chloroalkyl carbamates.

12807 Experiments on the Synthesis of the Pyrethrins. XIII. Total Synthesis of (±)-*cis*- and -*trans*-Chrysanthemumdicarboxylic Acid, (±)-*cis* - and - *trans* - Pyrethric Acid, and Rethrins II. L. Crombie, S. H. Harper, and K. C. Sleep. *Chemical Society, Journal,* June 1957, p. 2743-2754.

12808 Properties of Periodate-Oxidised Polysaccharides. VI. The Mucilage From *Dilsea edulis*. Vincent C. Barry and Joan E. McCormick. *Chemical Society, Journal,* June 1957, p. 2777-2783.

Successive periodate oxidations and phenylhydrazine degradations yield information concerning structures of the mucilage and its degradation products.

12809 ^{14}C-Labelled Polycyclic Aromatic Hydrocarbons. I. The Synthesis of [9-^{14}C] Anthracene and Some Methyl-Substituted Anthracenes. J. R. Catch and E. A. Evans. **II. The Synthesis of 1:2-Benzanthracene and Some Methyl-Substituted [^{14}C]-Benzanthracenes.** E. A. Evans. **III. The Synthesis of 1:2-5:6-[9-^{14}C] Dibenzanthracene.** J. R. Catch and E. A. Evans. *Chemical Society, Journal,* June 1957, p. 2787-2800.

12810 Addition of Free Radicals to Unsaturated Systems. XIV. The Direction of Radical Addition to Trifluoroethylene. R. N. Haszeldine and B. R. Steele. *Chemical Society, Journal,* June 1957, p. 2800-2806.

Radical attack on trifluoroethylene is 80% on the CHF group and 20% on the CF_2 group; attack by an atom is 60% on the CHF group and 40% on the CF_2 group. Proofs of structure are given for the reaction products from trifluoroiodomethane and trifluoroethylene, and for those from HBr and trifluoroethylene.

12811 The Constitution of Complex Metallic Salts. XVI. The Cuprous, Argentous, and Aurous Derivatives of *o*-Diethylphosphinophenyldiethylarsine. W. Cochran, F. A. Hart, and Frederick G. Mann. *Chemical Society, Journal,* June 1957, p. 2816-2828.

The various types of coordination derivatives which the ditertiary phosphine-arsine *o*-diethylphosphinophenyldiethylarsine forms with cuprous argentous, and aurous halides were surveyed.

12812* (German.) Pyrolysis of Pentachlorophenol. **Über die Pyrolyse des Pentachlorphenols.** Wilhelm Sandermann, Hans Stockmann, and Reinhard Casten. *Chemische Berichte,* v. 90, no. 5, 1957, p. 690-692.

Pyrolysis at 300 C produces perchlorobenzene and a compound $C_{12}O_2Cl_8$.

12813* (German.) New Method of Preparation of Phosphoric Acid Esters. Oxidation of Phosphorous Acid Esters. **Eine Neue Darstellungsmethode für Ester der Phosphorsäure. Oxydation von Estern der phosphorigen säure.** *Chemische Berichte,* v. 90, no. 5, 1957, p. 801-814.

Preparation of phosphorous acid esters by oxidizing phosphoric acid with permanganate.

12814* (German.) On Heterocyclic Seven-Ring Systems. **Über heterocyclische Siebenringsysteme. V.** Transformation of o-Phenylenediamines With α,β - Non - Saturated Carbonyl Compounds. **VI.** Transformation of o-Phenyldiamines With Hydroxymethylene-Acetophenone or Diketene. **Umsetzung von o-Phenylendiamin mit Hydroxymethylen-acetophenon bzw diketen. VII.** Reaction Process Between o-Phenyldiamine and Alkylidene-Pyroracemic Acid. **Der Reaktionsverlauf zwischen o-Phenylendiamin und alkyliden-brenztraubensäuren.** Walter Ried and Paul Stahlhofen. *Chemische Berichte,* v. 90, no. 5, 1957, p. 815-832.

12815* (German.) Metal - Organic Compounds. **Metallorganische Verbindungen.** Franz Hein. *Chemische Technik,* v. 9, Apr. 1957, p. 198-202.

Developments in the field of metal-organic compounds, their importance at the present time, and description of some reactions.

12816* (German.) Production of Vinylcarbazole. **Darstellung von Vinylcarbazol. I.** Ozias Solomon, Coman Ionescu, and Ion Ciută. *Chemische Technik*, v. 9, Apr. 1957, p. 202-204.

Preparation of vinylcarbozole by vinylation of carbazole with acetylene under pressure.

12817 New Syntheses of Chloropromazine. L. Toldy and I. Fabricius. *Chemistry & Industry*, no. 21, May 25, 1957, p. 665.

12818* (French.) Condensation of Benzyl Cyanide and Ketone. **Condensation du cyanure de benzyle et de l'acétone.** Jules Jarrousse. *Comptes Rendus*, v. 244, May 13, 1957, p. 2515-2518.

Condensation was accomplished in two different ways. Method includes the formation of an ammonium derivative of benzyl cyanide.

12819* (English.) **Further Characterization and Isolation Studies in the Muscarine Series.** K. Balenović, N. Bregant, and Z. Štefanac. *Croatica Chemica Acta*, v. 29, no. 1, 1957, p. 45-48.

Separation of muscarine from choline using ion exchange chromatography on Dowex 50X8 resin. Preparation and characteristics of muscarine tetraphenyboron.

12820* (Russian.) Mechanism of Alkylation of Alcohol by N-Trimethyl-α-Phenethylamonium Iodide. **Issledovanie mekhanizma alkilirovaniia spirtov iodistym N-trimetil-α-fenetilammoniem.** D. N. Kursanov and S. V. Vitt. *Doklady Akademii Nauk SSSR*, v. 113 no. 3, Mar. 21, 1957, p. 607-609.

Investigation of the mechanism of alkylation of methyl, ethyl, and *n*-butyl alcohols with the optically-active salt *d*-*N*-trimethyl-α-phenethylammonum iodide. The transfer of the ammonia nitrogen to the alcohol molecule was the primary interest of this study. Experimental data.

12821* Studies in the Formation of Heterocyclic Rings Containing Nitrogen. III. Condensation of 4-Methyl-*o*-Phenylene-Diamine With Aromatic Aldehydes. N. V. Subba Rao and C. V. Ratnam. *Indian Academy of Sciences, Proceedings*, v. 45, sec. A, Apr. 1957, p. 253-259.

Characteristics of 23 new compounds are given.

12822* (French.) New 1,4 Disubstituted Piperazine Derivatives. **Nouveaux dérivés de la pipérazine 1,4-disubstituée.** H. Morren, R. Denayer, R. Linz, J. Mathieu, H. Strubbe, and S. Trolin. *Industrie Chimique Belge*, v. 22, Apr. 1957, p. 409-420.

Preparation and properties.

12823* (French.) Constitution and Color of Formazan Compounds. **Constitution et couleur des composés formazanes.** Herbert Ziegler. *Industrie Chimique Belge*, v. 22, May 1957, p. 533-542.

The constitutional element determining the color of the formazans is the central azohydrazonic ring which has a mesomeric and alternatively polarized character.

12824* (Russian.) Investigations in Stereochemistry of Cyclic Compounds. **Issledovanie v oblasti stereokhimii tsiklicheskikh soedinenii. XVIII.** Synthesis of Trans-sin-cis-Decalin-1,2-Dicarboxylic Acid. **Sintez trans-sin-tsis-dekalin-1,2-dikarbonovoi kisloty.** I. N. Nazarov, B. F. Kucherov, and B. M. Andreev. *Izvestiia Akademii Nauk SSSR, Otdelenie Khimicheskikh Nauk*, no. 4, Apr. 1957, p. 471-478.

Synthesis by using the oxylation reaction of anhydride of sin-cis-Δ^4-octalin-1,2-dicarboxylic acid with peracetic acid.

12825* (Russian.) Organoboron Compounds. **Bororganicheskie soedineniia. XV.** Organoboron Compounds With Asymmetrical Boron Atom. **Bororganicheskie soedineniia s asimmetricheskim atomom bora.** B. M. Mikhailov, T. V. Kostroma, and N. S. Fedotov. *Izvestiia Akademii Nauk SSSR, Otdelenie Khimicheskikh Nauk*, no. 5, May 1957, p. 589-597.

Organoboron compounds were made from chloro derivatives which were prepared by reacting PCl_5 with the corresponding organoboron acid ether.

12826 Ferrocene: A Novel Organometallic Compound. Marvin Rausch, Martin Vogel, and Harold Rosenberg. *Journal of Chemical Education*, v. 34, June 1957, p. 268-272.

Preparation, physical properties, structure, aromatic character, reactions, and applications of ferrocene and its derivatives.

12827 Steroids. LXXXV. Synthesis of 4-Methyl and 4,4-Dimethyl Hormone Analogs. H. J. Ringold and G. Rosenkranz. *Journal of Organic Chemistry*, v. 22, June 1957, p. 602-605.

4,4-Dimethyl-Δ^5-androsten-3-one derivatives were prepared by alkylation of testosterone and 17 α-methyltestosterone. The dihydroallo compounds are derived by catalytic hydrogenation of the Δ^5-3-ones while the corresponding 3β, 17β-diols are obtained by borohydride reduction of the saturated and unsaturated ketones.

12828 4,5-Epoxy-3-Oxo Steroids. Roy H. Bible, Jr., Chester Placek, and Robert D. Muir. *Journal of Organic Chemistry*, v. 22, June 1957, p. 607-611.

Several 3-keto-Δ^4 steroids were converted to the corresponding epoxides. Both the α and the β epoxides of progesterone were isolated. Fermentation of 4,5-epoxypregnane-3, 20-dione by *Rhizopus nigricans* led to the isolation of 4β, 5-epoxy-11 α-hydroxypregnane-3,20-dione.

12829 Standard Method for Synthesis of Some 1-C^{14}-Labeled Amino Acids. Herbert J. Fromm. *Journal of Organic Chemistry*, v. 22, June 1957, p. 611-612.

Technique is limited to amino acids which form phthaloyl derivatives.

12830 1-[(2-Dialkylaminoethoxy)Phenyl]-2-Amino-1-Propanols. Robert I. Meltzer and Arnold D. Lewis. *Journal of Organic Chemistry*, v. 22, June 1957, p. 612-617.

Preparation and properties of 40 compounds.

12831 Tertiarybutylbenzenes. IV. Mechanism of Friedel-Crafts Cyclialkylations With *Tert*-Butyl Chloride. Comparative Alkylations With 2-Chloro-2,5-Dimethylhexane. L. Ross, C. Barclay, and John W. Hilchie. *Journal of Organic Chemistry*, v. 22, June 1957, p. 633-635.

12832 *Ortho*-Alkylation of Aromatic Amines. George G. Ecke, John P. Napolitano, Allen H. Filbey, and Alfred J. Kolka. *Journal of Organic Chemistry*, v. 22, June 1957, p. 639-642.

Primary and secondary aromatic amines react with olefins in the presence of Al anilide type catalysts to yield products alkylated in the *ortho* positions. No *para* alkylated products were detected.

12833 Sodium Acetylide. I. Preparation of Sodium Acetylide by Reaction of Acetylene With Sodium in Organic Media. T. F. Rutledge. *Journal of Organic Chemistry*, v. 22, June 1957, p. 649-652.

12834 Synthesis and Isomerization of Substituted 5-Amino-1,2,3-Triazoles. Eugene Lieber, Tai Siang Chao, and C. N. Ramachandra Rao. *Journal of Organic Chemistry*, v. 22, June 1957, p. 654-662.

Synthesis reactions involved the base-catalyzed condensation of alkyl- and aryl-azides with malonic ester, cyanoacetic ester, and phenylacetonitrile.

12835 Friedel-Crafts Acylations of 3-Chloro-4-Methoxybiphenyl. Ng. Ph. Buu-Hoi, Michel Sy, and Jean Riché. *Journal of Organic Chemistry*, v. 22, June 1957, p. 668-671.

A large number of new derivatives of 3-chloro-4-hydroxybiphenyl and its methyl ether (ketones, phenols, and quinolines) were synthesized.

12836 The Non-Volatile Organic Acids of Lucerne. A. Richardson and A. C. Hulme. *Journal of the Science of Food and Agriculture*, v. 8, June 1957, p. 326-330.

A combination of ion exchange and partition chromatography indicated the presence of L-malic, malonic, succinic, α-ketoglutaric, fumaric, glyceric, pyrrolidonecarboxylic, shikimic, quinic, citramatic, and glycollic acids, also an unidentified dibasic acid, ($C_7H_9O_8$).

12837 The Stability of Lycopene. I. Degradation by Oxygen. II. Oxidation During Heating of Tomato Pulps. E. R. Cole and N. S. Kapur. *Journal of the Science of Food and Agriculture*, v. 8, June 1957, p. 360-368.

12838* The Structure of Sterculic Acid. J. P. Varma, Sharda Dasgupta, Bhola Nath, and J. S. Aggarwal. *Journal of Scientific & Industrial Research*, v. 16, sec. B, Apr. 1957, p. 162-167.

The structure of ω-(2-*n*-hexylcyclopropyl)-9 : 10-decenoic acid was assigned on the basis of reactions such as hydrogenation, $KMnO_4$ oxidation, ozonization, periodic acid fission, and infrared spectra of the acid and its derivatives.

12839 Calophyllum *Inophyllum* Linn. II. Constitution of Inophyllic Acid. Chittaranjan Mitra. *Journal of Scientific & Industrial Research*, v. 16, sec. B, Apr. 1957, p. 167-172.

The structure ω-phenyl-2,7-dimethyl-5-one-6,8-non-dienoic acid is tentatively suggested.

12840* (Russian.) Condition and Outlook of the Development of Vinyl Chloride Production. **Sostoianie i perspektivy razvitiia proizvodstva khloristogo vinila.** V. N. Antonov. *Khimicheskaia Nauka i Promyshlennost*, v. 11, no. 1, 1957, p. 53-59.

Dehydrochlorination of dichloroethane with alkali in alcoholic solution. Hydrochlorination of acetylene. Pyrolysis of dichloroethane. High-temperature ethylene chlorination. Comparison of of production methods for vinyl chloride.

12841* (Russian.) Effect of Inhibitors on Kinetics of Hydrocarbon Autoxidation. **Ob osobennostiakh deistviia zamedlitelei na kinetiku avtookisleniia uglevodorodov.** K. I. Ivanov and E. D. Vilianskaia. *Khimiia i Tekhnologiia Topliva, i Masel*, no. 4, Apr. 1957, p. 11-21.

Screening tests followed by a thorough study of the behavior of 2,6-di-*tert*-butyl-4-methyl-phenol.

12842* (Hungarian.) The Role of Aluminum-Halide Alcoholates in the Meerwein-Ponndorf-Verley Reduction. **Alumínium-halogénalkoholátok szerepe a Meerwein-Ponndorf-Verley-redukciónál. V.** Reduction of α-Oxyiminoketones. **α-Oximinoketonok redukciója.** György Gál, István Földesi, and Istvánne Krasznai. *Magyar Kémiai Folyóirat*, v. 63, Jan. 1957, p. 5-11.

12843* (German.) Linear Adipic Acid Oligamides With Hexamethylene Diamine. **Über Lineare Oligamide der Adipinsäure mit Hexamethylendiamin.** Helmut Zahn and Werner Lauer. *Makromolekulare Chemie*, v. 23, nos. 2-3, 1957, p. 85-118.

Hexamethylene diamine and adipic acid, the two components of nylon, can form three linear-polymer homologous series: diamines, dicarboxylic acids, and amino acids. The first three members of the diamine and the dicarboxylic acid series were prepared; also the mono-, di-, and tetramer of the amino acid series. The oligoamides were subjected to X-ray examination.

12844* The Chemistry of Sphingosine. Cyril A. Grob. *Record of Chemical Progress*, v. 18, no. 2, 1957, p. 55-66.

A review of work on structure, synthesis, and properties.

12845* (English.) **Preparation of Quinazoline Derivatives Through Ring-Closure of Aromatic *Ortho*-Cyano-Acylamino Compounds in Alkaline Alcoholic or Phenolic Medium. I. 4-RO-Substituted Quinazolines.** K. W. Breukink, L. H. Krol, P. E. Verkade, and B. M. Wepster. *Recueil des Travaux Chimiques des Pays-Bas*, v. 76, May 1957, p. 401-414.

On boiling aromatic *ortho*-cyano-acylamino compounds in alkaline alcoholic or phenolic solution - meduim ROH - 4-RO-substituted quinazolines are formed. Some examples of this reaction are described.

12846* (English.) **On the Absolute Configuration of Sedamine and Sedridine.** H. C. Beyerman, J. Eenshuistra, and W. Eveleens. *Recueil des Travaux Chimiques des Pays-Bas*, v. 76, May 1957, p. 415-418.

The resolution of (±)-*allo*-sedamine into its optical components and of (±)-sedridine yielding (+)-sedridine is reported.

12847 (French.) Studies of the Antioxidant Properties of Some Alkyl Phenols. **Étude des propriétés antioxygènes de quelques alcoylphénols.** G. Parc. *Revue de l'Institut Français du Petrole et Annales des Combustibles Liquides*, v. 12, Mar. 1957, p. 304-329.

Mechanisms of oxidation of hydrocarbons in the liquid phase and inhibitor action. Preparation, characteristics, and antioxidant properties of some compounds.

12848 The Influence of Heavy Foreign Gases on the Formation and Decomposition of Ethane. B. N. Parsons, C. J. Danby, and Cyril Hinshelwood. *Royal Society, Proceedings*, v. 240, ser. A, June 11, 1957, p. 333-339.

The effects of SF_6, CF_4, CO_2, and NO were studied.

12849 The Addition of Methyl Radicals to Ethylene, Propylene, the Butenes and Higher l-Olefines. R. P. Buckley and M. Szwarc. *Royal Society, Proceedings*, v. 240, ser. A, June 11, 1957, p. 396-407.

The relative rate constants of addition of ethylene, propylene and *iso*-butene determined at 65 C are 34, 22, and 36 respectively. Identical rates of addition were found for propylene, butene-l, pentene-l, 3 methyl butene-l, heptene-l, decene-l, and hexadecene-l, indicating that the rates of addition are not affected by the length and the shape of the hydrocarbon "tail".

12850* (Russian.) Synthesis and Properties of Arylnitromethanes. **Sintez i svoistva arilnitrometanov.** S. S. Novikov and L. I. Khmelnitskii. *Uspekhi Khimii*, v. 26, Apr. 1957, p. 459-493.

Several methods of preparation of the arylnitromethanes are given. The properties of arylmononitro-methane, aryldinitromethane, and aryltrinitromethane are listed.

12851* (Russian.) Reaction Between Silicon Tetrachloride and Acetic and Benzoic Anhydrides. **O vzaimodeistvii chetyrekh-khloristogo kremniia s uksusnym i benzoinym angidridami.** V. V. Udovenko and Iu. Ia. Fialkov. *Zhurnal Obshchei Khimii*, v. 27, Apr. 1957, p. 905-906.

Silicon tetrachloride reacts directly with organic acid anhydrides, forming mixed anhydrides of the organic and orthosilicic acids.

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12852* (English.) **Electronic Structure of Metal Aromatic Complexes.** A. D. Liehr and C. J. Ballhausen. *Acta Chemica Scandinavica*, v. 11, no. 2, 1957, p. 207-218.

Electronic structure of aromatic complexes formed by *cyclo*pentadienyl radical and by benzene utilizing the wave functions given by molecular-orbital theory.

12853* (English.) **The Effect of Volatile Substances on the Chemical Activity of Ultrasonic Cavitation.** Nils Ellfolk and Artturi I. Virtanen. *Acta Chemica Scandinavica*, v. 11, no. 2, 1957, p. 230-234.

Butanol, propanol, and others are able to inhibit practically all reactions.

12854* (English.) **Mercury(II) Halide Mixed Complexes in Solution. I. The Experimental Method and the Distribution of the Neutral Complex.** Y. Marcus. *Acta Chemica Scandinavica*, v. 11, no. 2, 1957, p. 329-339.

The distribution coefficients and solubilities are reported.

12855* (English.) **On the Hydrolysis of Trialkylphenoxysilanes. II.** Evert Åkerman. *Acta Chemica Scandinavica*, v. 11, no. 2, 1957, p. 373-381.

Spectrophotometric study of the hydrolysis of 12 compounds in aqueous ethanol.

12856 Reactions of Gaseous Ions. II. Acetylene. F. H. Field, J. L. Franklin, and F. W. Lampe. *American Chemical Society, Journal*, v. 79, June 5, 1957, p. 2665-2669.

Reactions of several organic positive ions with acetylene were identified; rates are in approximate agreement with values calculated theoretically.

12857 Electronic and Vibrational States of the Nitrite Ion. I. Electronic States. II. Vibrational States. Jerome W. Sidman. *American Chemical Society, Journal*, v. 79, June 5, 1957, p. 2669-2678.

12858 Rate Constants for the Recombination of Iodine Atoms in Liquid Hexane and Decane; Temperature Coefficient for the Recombination in Carbon Tetrachloride. Sukumar Aditya and John E. Willard. *American Chemical Society, Journal*, v. 79, June 5, 1957, p. 2680-2681.

Above determined by using flash photolysis techniques.

12859 Electrochemical Behavior of Aromatic N-Nitrosohydroxylamines. Philip J. Elving and Edward C. Olson. *American Chemical Society, Journal*, v. 79, June 5, 1957, p. 2697-2704.

Reports behavior of N-nitrosophenylhydroxylamine, N-nitroso-α-naphthylhydroxylamine, and N-nitroso-*p*-xenylhydroxylamine.

12860 Homogeneous Metal Salt Catalysis in Organic Reactions. I. The Preparation of Vinyl Ethers by Vinyl Transetherification. Warren H. Watanabe and Lawrence E. Conlon. **II. The Reaction of Vinyl Ethers With Aminoalcohols and 1,2-Diamines.** Warren H. Watanabe. *American Chemical Society, Journal*, v. 79, June 5, 1957, p. 2828-2836.

12861 Solvents Having High Dielectric Constants. V. Limiting Ionic Equivalent Conductances in N-Methylacetamide at 40 C. Lyle R. Dawson, Eugene D. Wilhoit, Richard R. Holmes, and Paul G. Sears. *American Chemical Society, Journal*, v. 79, June 20, 1957, p. 3004-3006.

Studies were made concerning the conductance behavior of 20 uni-univalent electrolytes in N-methyl acetamide at concentrations in the range 1-165 x 10^{-4} *N*.

12862 Interaction of Polyelectrolytes With the Electrical Double Layer on Mercury-Water Interfaces. II. Influence of Added Ionized Polyacids on the Differential Capacity. Israel R. Miller and David C. Grahame. *American Chemical Society, Journal*, v. 79, June 20, 1957, p. 3006-3012.

12863 The Solubility of the Post-Transition Metals in Their Molten Halides. John D. Corbett, Samuel von Winbush, and Frank C. Albers. *American Chemical Society, Journal*, v. 79, June 20, 1957, p. 3020-3024.

The solubilities of the respective metals in molten PbI_2, $SbCl_3$, SbI_3, $ZnCl_2$, ZnI_2, CdI_2 and $GaBr_2$ are reported.

12864 Praseodymium Oxides. IV. A Study of the Region $PrO_{1.833}$-$PrO_{2.000}$. C. L. Sieglaff and L. Eyring. *American Chemical Society, Journal*, v. 79, June 20, 1957, p. 3024-3026.

X-ray powder diagrams of quenched, analyzed samples were taken to determine the phase present. A two-phase system was found for the region $PrO_{1.833}$-$PrO_{2.00}$ at preparation temperatures below 350 C and oxygen pressures less than ten atmospheres. Lattice constants are given for the various phases found.

12865 Reactivities of Several ω-Substituted Primary Alkyl Bromides With Tertiary Amines. Katsuhiko Akagi, Shigeru Oae, and Masuo Murakami. *American Chemical Society, Journal*, v. 79, June 20, 1957, p. 3118-3120.

Rate constants, heats of activation and entropies of activation were determined for a series of reactions between ω-substituted primary alkyl bromides and tertiary amines in two different solvents, i.e., nitrobenzene and 50% ethanol. Alternation of reactivities was observed when nitrobenzene was used as a solvent, but no such phenomenon was observed when the solvent was 50% ethanol. The phenyl group showed little polar influence on the reactivities.

12866 Heats of Mixing of Liquids. H. W. Schnaible, H. C. Van Ness, and J. M. Smith. *A.I.Ch.E. Journal*, v. 3, June 1957, p. 147-152.

Experimental data for ten binary and five ternary systems, at 25 C and 1 atm. pressure.

12867 Densities of Liquid-Acetone-Water Solutions up to Their Normal Boiling Points. K. T. Thomas and R. A. McAllister. *A.I.Ch.E. Journal*, v. 3, June 1957, p. 161-164.

Densities were measured over the entire composition range from 20 to within 3 to 7 C of the normal boiling point of the mixture, using a Robertson pycnometer.

12868 Ion Exclusion Equilibria in the System Glycerol-Sodium Chloride-Water-Dowex-50. Edward L. Shurts and Robert R. White. *A.I.Ch.E. Journal*, v. 3, June 1957, p. 183-186.

Ion exclusion is an operation in which an ion exchange resin is used to separate an electrolyte from a nonelectrolyte in a polar solvent. This is described quantitatively by the equilibrium distribution of the electrolyte, the nonelectrolyte, and the solvent between the resin phase and the liquid phase surrounding the resin.

12869 Equilibrium in the System Cu^{++}-Na^{+}-Dowex-50. H. C. Subba Rao and M. M. David. *A.I.Ch.E. Journal*, v. 3, June 1957, p. 187-190.

Equilibrium isotherms are presented for the cation exchange of Cu and Na on Dowex-50 resin in solutions from 0.01 to 4*N* in chloride content, and the equilibrium data are correlated on the basis of the Donnan equilibrium.

12870 Vapor-Liquid Equilibria of Benzene-*N*-Hexane and Benzenecyclohexane Systems. V. N. Kumarkrishna Rao, D. R. Swami, and M. Narasinga Rao. *A.I.Ch.E. Journal*, v. 3, June 1957, p. 191-197.

Vapor-liquid equilibria were measured at pressures from 4 to 18 atm. The three-constant Redlich-Kister equation was found satisfactory for correlation.

12871 Diffusion in Three-Component Gas Mixtures. H. L. Toor. *A.I.Ch.E. Journal*, v. 3, June 1957, p. 198-207.

A solution to the Stefan-Maxwell diffusion equations for equimolal countercurrent diffusion is obtained which is similar in form to Gilliland's equation for diffusion of two gases through a third inert gas. Conditions under which diffusion barrier, osmotic diffusion, and reverse diffusion phenomena occur are determined.

12872 Phase Behavior of Hydrogen-Light-Hydrocarbon Systems. A. L. Benham, D. L. Katz, and R. B. Williams. *A.I.Ch.E. Journal*, v. 3, June 1957, p. 236-241.

Methods of predicting equilibrium-phase compositions are presented. The correlations are satisfactory for binary and certain ternary systems, but are not reliable for complex mixtures.

12873 Volumetric and Phase Behavior in the Hydrogen-*n*-Hexane System. W. B. Nichols, H. H. Reamer, and B. H. Sage. *A.I.Ch.E. Journal*, v. 3, June 1957, p. 262-267.

Study involved measurements of the specific volume of four mixtures of hydrogen and *n*-hexane at eight temperatures between 40 and 460 F for pressures up to 10,000 lb./sq. in.

12874 Mass Transfer in a Continuous-Flow Mixing Vessel. D. W. Humphrey and H. C. Van Ness. *A.I.Ch.E. Journal*, v. 3, June 1957, p. 283-286.

Mass transfer coefficients were determined for the dissolution of $Na_2S_2O_3 \cdot 5H_2O$ crystals in water under conditions of turbulent agitation in a mixing vessel.

12875* (German.) Chemisorption of Alcohols on Amorphous Silicon Dioxide. **Chemisorption von Alkoholen an Amorphem Siliciumdioxyd.** W. Stöber, G. Bauer, and K. Thomas. *Annalen der Chemie*, v. 604, May 1957, p. 104-110.

Surface reactions on the hydroxyl groups of the adsorbent occur in the form of esterification. Methanol, ethanol, propanol, and butanol were used.

12876 Iodine Complexes in Inert Solvents. VII. Thermodynamic Constants and Spectroscopic Data for the Reaction $2I_2 = I_4$ in Carbon Tetrochloride. P. A. D. de Maine. *Canadian Journal of Chemistry*, v. 35, June 1957, p. 573-576.

12877 Mercury Photosensitized Decomposition of Butylene Oxide. R. J. Cvetanović and L. C. Doyle. *Canadian Journal of Chemistry*, v. 35, July 1957, p. 605-612.

Mercury photosensitized decomposition of *trans*-2,3-epoxy butane was studied at 25 C. The quenching efficiency of this compound is 1.23 relative to the quenching efficiency of N_2O taken as unity; the quenching cross section is, therefore, 19 A.^{2} (taking 3.6 A.^{2} for the quenching cross section of *n*-butane). The main products formed are isobutanal, C_2H_6, CO, C_2H_4, C_2H_2, CH_3CHO, C_2H_5CHO, $CH_3COC_2H_5$, CH_4, and H_2.

12878 Reactions of Sulphonic Esters. VI. The Temperature Dependence of the Rate for the Hydrolysis of a Series of Alkyl Benzenesulphonates. R. E. Robertson. *Canadian Journal of Chemistry*, v. 35, July 1957, p. 613-622.

12879 Ractions of Arylsulphonic Esters. VII. The Heat Capacity of Activation for the Ethanolysis of Methyl *p*-Nitrobenzenesulphonate. J. B. Hyne and R. E. Robertson. *Canadian Journal of Chemistry*, v. 35, July 1957, p. 623-629.

12880 The Dipole Moments of Mercuric Chloride and Mercuric Bromide in Benzene. A. R. Tourky and H. A. Rizk. *Canadian Journal of Chemistry*, v. 35, July 1957, p. 630-633.

From dielectric constant measurements in benzene for the two halides $HgCl_2$ and $HgBr_2$, the dipole moments are 1.23 and 0.95 D. respectively. Thus, they apparently possess angular structures.

12881 Polarographic Behavior of the Viologen Indicators. R. M. Elofson and R. L. Edsberg. *Canadian Journal of Chemistry*, v. 35, July 1957, p. 646-650.

The polarographic behavior of 1,1′-dimethyl- and 1,1′-dibenzyl-4,4′-bipyridinium dichloride was investigated over the pH range of 1 to 13. Reversible reduction waves were obtained for the first single-electron step for both compounds.

12882 The Kinetics of Adsorption of *n*-Heptane on Carbon Black at Low Pressures. J. R. Dacey, D. M. Young, and H. J. McDougall. *Canadian Journal of Chemistry*, v. 35, July 1957, p. 689-703.

The rates of adsorption at constant pressure of *n*-heptane on "Spheron 6" carbon black were measured between 0 and 30 C in the pressure range 0.005-0.120 mm., using a sensitive quartz spiral technique. The diffusion coefficent was calculated both as a function of temperature and as a function of surface concentration, and the activation energy for diffusion was calculated as a function of surface concentration.

12883 Structure of the Fundamental Infrared Band of Hydrogen in Pressure Induced Absorption. H. P. Gush, A. Nanassy, and H. L. Welsh. *Canadian Journal of Physics*, v. 35, June 1957, p. 712-719.

12884 High Resolution Raman Spectroscopy of Gases. IX. Spectra of H_2, HD, and D_2. B. P. Stoicheff. *Canadian Journal of Physics*, v. 35, June 1957, p. 730-741 + 1 plate.

12885 Solutions of Sulphur in Oleum. I. Electron-Spin Resonance of Solutions of Sulphur in Oleum. D. J. E. Ingram and M. C. R. Symons. **II. Visible and Ultraviolet Absorption Spectra.** M. C. R. Symons. *Chemical Society, Journal*, June 1957, p. 2437-2444.

12886 The Dipole Moments of Some Aromatic Nitro-Compounds in Relation to the Steric Inhibition of the Mesomeric Effect of the Nitro-Group. A. C. Littlejohn and J. W. Smith. *Chemical Society, Journal*, June 1957, p. 2476-2482.

12887 Boiling Points of Homologous Liquids. G. R. Somayajulu and Santi R. Palit. *Chemical Society, Journal*, June 1957, p. 2540-2544.

The equation $T_b = a \vee (\Sigma Z) + b$ represents the boiling points of many homologous series such as *n*-alkyl fluorides, chlorides, bromides, iodides, acids, amines, aldehydes, ketones, *n*-alkylbenzenes, *-cyclo*-hexanes, and *-cyclo*hex-1-enes, where Σ Z is the atomic number sum and a and b are constants characteristic of any particular series.

12888 The Exchange of Oxygen Between Alcohols and Water. III. Acid-Catalysed Racemization and Oxygen Exchange of 1-Phenylethyl Alcohol in Dilute Aqueous Solutions. Ernest Grunwald, Adam Heller, and F. S. Klein. *Chemical Society, Journal*, June 1957, p. 2604-2613.

Specific exchange rates measured in dilute aqueous solution are compared with rates of racemization of optically active alcohol and of olefin formation under the same conditions.

12889 Spectroscopic Studies. I. 2:4-Dinitrophenylhydrazones in Neutral and in Alkaline Solutions. C. J. Timmons. *Chemical Society, Journal*, June 1957, p. 2613-2623.

12890 A Simple Molecular-Orbital Treatment of the Hammett $p\sigma$ Equation: Inductive Constants of the Common Substituents. David Peters. *Chemical Society, Journal*, June 1957, p. 2654-2657.

A simple perturbation treatment of the Hückel molecular-orbital method is applied to the σ-constants of the Hammett $p\sigma$ equation. A series of inductive constants is deduced for the common substituents.

12891 Infrared Spectra and the Polymorphism of Glycerides. III. Palmitodistearins and Dipalmitostearins. D. Chapman. *Chemical Society, Journal*, June 1957, p. 2715-2720.

12892 The Infrared and Raman Spectra of Trifluoroacetaldehyde. R. E. Dodd, H. L. Roberts, and L. A. Woodward. *Chemical Society, Journal*, June 1957, p. 2783-2786.

12893* (German.) Spectroscopic Investigation of Carbonyl- and Thiocarbonyl-Compounds. **Spektroskopische untersuchungen an carbonyl- und Thiocarbonylverbindungen.** Rolf Mecke, Reinhard Mecke, and Arthur Lüttringhaus. *Chemische Berichte*, v. 90, no. 6, 1957, p. 975-986.

Study of molecules having carbonyl or thiocarbonyl groups in the pentacycle. Influence of neighbor atoms and effects of circumferential stress.

12894 Physical Chemical Properties of the System NaCl-$ZrCl_4$, KCl-$ZrCl_4$, and NaCl-KCl-$ZrCl_4$. H. H. Kellog, L. J. Howell, and R. C. Sommer. *Columbia University, School of Mines (U. S. Atomic Energy Commission)*, NYO-3109, Aug. 1955, 24 p. (UF767 U3ny Contin.)

12895* (French.) Infra-Red Spectra of NN′-Disubstituted Acetamidines. **Spectres d'absorption infrarouges d'acétamidines NN′-disubstituées.** Dušan Prevoršek. *Comptes Rendus*, v. 244, May 20, 1957, p. 2599-2602.

IR spectra in the solid state and in solution, and also homologs combined with deuterium. The bands caused by the vibrations of the amidine group were located and data obtained on the geometry of the molecule.

12896* (French.) Changes in the Infra-Red Spectrum of Barium Titanate. **Modifications dans le spectre d'absorption infrarouge du titanate de baryum.** Armand Hadni and René-Lucien Michel. *Comptes Rendus*, v. 244, May 20, 1957, p. 2602-2603.

The IR spectrum of a very thin single crystal of barium titanate obtained by crystallization and that of the same crystal in a powdered state are completely different. The brighter band moves from 770 to 510 $Cm.^{-1}$.

12897* (French.) Studying the Structure of Metallic Sulfites With the Aid of Infra-Red Absorption Spectrography. **Étude de la structure des sulfites métalliques par spectrographie d'absorption in frarouge.** Claude Rocchiccioli. *Comptes Rendus*, v. 244, May 27, 1957, p. 2704-2706.

The fundamental vibrations of metallic sulfites were identified. The sulfurous ions seem to form pyramids and have the C_{3v} symmetry.

12898* (English.) **Methories of the Precipitation Processes. XIV. New Maxima on the Precipitation Curves of Mixed Silver Halides.** B. Černicki and B. Težak. *Croatica Chemica Acta*, v. 29, no. 1, 1957, p. 7-13.

Series of mixed Ag halide colloidal systems were prepared and their growth studied tyndallometrically. A temperature increase changes rate of growth of colloidal particles and their ionic solubility at the same time.

12899 Dissolution of Iron in Acidified Chromic Chloride Solutions. Robert Skomoroski and Cecil V. King. *Electrochemical Society, Journal*, v. 104, July 1957, p. 417-419.

12900 Optical Dispersion Electrons, Molecular Structure, Thermodynamic Properties and Electron Impact Ionization of Saturated Hydrocarbons. I. The Determination of the Effective Number of Dispersion Electrons and the Correlation With Molecular Structure. C. W. Nutt and A. Labbauf. **II. The Optical Dispersion Electrons, Thermodynamic Properties and Electron Impact Ionization of Saturated Hydrocarbons.** C. W. Nutt. *Faraday Society, Transactions*, v. 53, June 1957, p. 729-737.

12901 The Reactions of Co(III) With Water and With Hydrogen Peroxide. J. H. Baxendale and C. F. Wells. *Faraday Society, Transactions* v. 53, June 1957, p. 800-812.

Evidence is found for the formation of a species Co(III) HO_2. Its formation constant is obtained.

12902 Investigations of Reactions Along the Catalyst Bed in Flow Systems by Vapour-Phase Chromatography. I. The Decomposition of Methanol on a Cobalt Fischer-Tropsch Catalyst. P. W. Darby and C. Kemball. *Faraday Society, Transactions*, v. 53, June 1957, p. 832-840.

Gives an example of the process over the temperature range 163-210 C.

12903* (Italian.) Infrared Spectra and Structure of Glyoximes. Glyoxime and Di-Halogen Glyoximes. **Spettri infrarossi e strutura delle gliossime.** Enzo Borello and Marina Colombo. *Gazzetta Chimica Italiana*, v. 87, May 1957, p. 615-629.

IR spectral absorptions of Glyoxime, assumed as having a central symmetric, flat, solid structure. Hydroxyl glyoxime combined with deuterium, dichloro- and dibromo glyoximes were used. IR dichroism.

12904* Optical Properties and Unit Cell Parameters of Nickel Nitrate Hexahydrate. A. Jayaraman. *Indian Academy of Sciences, Proceedings*, v. 45, sec. A, Apr. 1957, p. 263-267.

12905 Decomposition of Hydrogen Peroxide Vapor on Relatively Inert Surfaces. Charles N. Satterfield and Theodore W. Stein. *Industrial and Engineering Chemistry*, v. 49, July 1957, p. 1173-1180.

Studies with glass, polymer, and metal surfaces provide comparisons of their relative activities plus useful data on H_2O_2 vapor decompositions.

12906* (French.) Figurative Curves of the Electrolytic Dissociation of Ethylenediamine Tetraacetic Acid and of 1,2 Diaminocyclohexane-N-N'-Tetraacetic Acid. **Courbes deprésentatives de la dissociation électrolytique de l'acide éthylènediaminetétracétique et de l'acide 1,2 diaminocyclohexane -N,N' tétracétique.** C. Vandael. *Industrie Chimique Belge*, v. 22, Apr. 1957, p. 393-408.

12907* (French.) Orientation Phenomena in Chlorine Substitution of Normal Chain Saturated Aliphatics. **Les phénomènes d'orientation, dans la substitution par le chlore, chez les aliphatiques saturés à chaine normale.** Hervé Magritte and Albert Bruylants. *Industrie Chimique Belge*, v. 22, May 1957, p. 547-561.

12908* (Russian.) Semiquantitative Theory of Mutual Influences of Atoms in Organic Compounds. **Opyt polukolichestvennoi teorii vzaimnogo vliianiia atomov v organicheskikh soedineniiakh. III.** Electronic Bond Charges and Chemical Properties of Molecules. Mechanism of Mutual Influences of Atoms. **Elektronnye zariady sviazei i chimicheskie svoistva molecul. Mekhanism vzaimnogo vliianiia atomov.** G. V. Bykov. *Izvestiia Akademii Nauk SSSR, Otdelenie Khimicheskikh Nauk*, no. 5, May 1957, p. 554-562.

12909* (French.) Existence of Mixed and Complex Silver Chlorobromide Ions. **Sur l'existence d'ions complexes mixtes argentichlorobromure.** M. H. Chateau and B. Hervier. *Journal de Chimie Physique*, v. 54, May 1957, p. 356-362.

By adding a Ag salt to a solution of KCl and KBr, two complex mixed ions $AgClBr_3^{-3}$ and $AgCl_2Br^{-3}$ were formed. Dissociation constants were determined at 25 C.

12910 An Investigation of Fused-Salt Systems Based on Thorium Fluoride. II. V. S. Emelyanov and A. I. Evstyukhin. *Journal of Nuclear Energy*, v. 5, no. 1, 1957, p. 108-114. (From *Atomnaia Energiia*, v. 1, no. 5, 1956, p. 80.)

Data on the systems NaF-ThF_4, KF-ThF_4, NaF-KF-ThF_4, and the polythermal section NaF-$KThF_5$.

12911 Ultraviolet-Visible Absorption Spectra of Quinoxaline Derivatives. Eugene Sawicki, Barbara Chastain, Hazel Bryant, and Albert Carr. *Journal of Organic Chemistry*, v. 22, June 1957, p. 625-629.

More than forty spectra of 15 quinoxaline derivatives were determined in alcoholic and acidic solutions.

12912 An Electrochemical Study of Hydrogen Producing Reactions Catalyzed by Gold and Gold-Palladium Cathodes. Sigmund Schuldiner and James P. Hoare. *Journal of Physical Chemistry*, v. 61, June 1957, p. 705-708.

The H overvoltage of Au, β-phase-Pd-H, and Au-Pd alloys of Au/Pd atomic ratios 0.24, 0.43, 0.88, and 2.70 were determined. It was found that the rate-controlling step for the H producing reaction on β-phase-Pd-H alloy, and Au-Pd alloys up to a Au/Pd ratio of 0.6 was the electrochemical desorption; beyond this ratio and for pure Au the rate-controlling step was the combination of H atoms.

12913 The Thermo-Osmosis of the Rare Gases Through a Rubber Membrane. Richard J. Bearman. *Journal of Physical Chemistry*, v. 61, June 1957, p. 708-713.

A theory of thermo-osmosis based on the thermodynamics of irreversible processes is developed. Results on the thermo-osmosis through a rubber membrane of the rare gases (with the exception of radon) and of CO_2 are presented and then interpreted.

12914 Aging of Silica-Alumina Cracking Catalyst. I. Kinetics of Structural Changes by Heat and Steam. W. G. Schlaffer, C. Z. Morgan, and J. N. Wilson. **II. Electron Microscope Studies.** C. R. Adams and H. H. Voge. *Journal of Physical Chemistry*, v. 61, June 1957, p. 714-727.

A systematic study of the rate of change in the specific surface area and specific pore volume of silica-alumina cracking catalysts when exposed to temperatures in the range 478 to 950 C and steam partial pressures in the range 0 to 7 atmospheres.

12915 On the Structure of the Rhenide Ion. J. W. Cobble. *Journal of Physical Chemistry*, v. 61, June 1957, p. 727-729.

Thermodynamic factors controlling the stability of the rhenide ion. The conclusion is reached that rhenide exists in aqueous solution as an oxygenated complex, and that solid rhenides must be "hydrated" to be stable.

12916 Thermodynamic Properties of Selected Methylbenzenes From 0 to 1000 K. S. H. Hastings and D. E. Nicholson. *Journal of Physical Chemistry*, v. 61, June 1957, p. 730-735.

Values of the heat capacity, heat content function, free energy function, entropy, heat of formation, and free energy of formation were calculated at selected temperatures from 0 to 1000 K for eight methylbenzenes in the ideal gas state.

12917 The Electrophoretic Mobility of Decyl-, Dodecyl- and Tetradecylamine Hydrochloride Micelles. H. W. Hoyer and A. Greenfield. *Journal of Physical Chemistry*, v. 61, June 1957, p. 735-738.

Electrophoretic mobilities of the micelles were studied as functions of their concentrations in aqueous solutions. In addition, the effect of ionic strength and temperature upon micelle mobility was studied for the dodecylamine hydrochloride micelle.

12918 The Crystal Structure of Monoclinic Sm_2O_3. Don T. Cromer. *Journal of Physical Chemistry*, v. 61, June 1957, p. 753-755.

This form of Sm_2O_3 is monoclinic, probable space group C2/m, with $a = 14.17_7$, $b = 3.63_3$ and $c = 8.84_7$, all ± 0.01 A, and $\beta = 99.96 \pm 0.03°$. There are six formula units per unit cell.

12919 The Catalytic Properties of Supported Sodium and Lithium Catalysts. Sterling E. Voltz. *Journal of Physical Chemistry*, v. 61, June 1957, p. 756-758.

The catalytic properties of supported alkali metal catalysts for hydrogen-deuterium exchange and ethylene hydrogenation were investigated. Sodium dispersed on dried alumina does not increase the activity of the alumina for hydrogen-deuterium exchange. However, hydriding the sodium-alumina greatly increases the exchange activity, the hydrided catalyst being active even at −195 C.

12920 Vacancy Distribution and Bonding in Some Oxides of Spinel Structure. K. P. Sinha and A. P. B. Sinha. *Journal of Physical Chemistry*, v. 61, June 1957, p. 758-761.

The nature of the vacancy distribution in the defect spinel-type oxides γ-Fe_2O_3, γ-Mn_2O_3, γ-Cr_2O_3 and γ-Al_2O_3 is considered in the light of the available magnetic and structural data. It is concluded that all vacancies lie in octahedral sites, their distribution being ordered in γ-Fe_2O_3, but random in the cases of the other oxides.

12921 The Formation of Oxide Films and Copper Powder on the (111) Face of a Copper Single Crystal During the Catalytic Reaction of Hydrogen and Oxygen. Robert E. Cunningham and F. W. Young, Jr. *Journal of Physical Chemistry*, v. 61, June 1957, p. 769-773.

The catalytic reaction of H and O was studied on the (111) face of a single crystal of Cu in the temperature range of 325 to 425 C with O concentrations of 0 to 17 mole %. The surface was examined with elliptically polarized light during the reaction to detect the presence of any oxide films on the surface.

12922 The Heat Capacity of Solid Deuterium Between 0.3 and 13 K. O. D. Gonzalez, David White, and H. L. Johnston. *Journal of Physical Chemistry*, v. 61, June 1957, p. 773-780.

The heat capacity of solid normal deuterium and solid mixtures containing 3, 14.5, and 18.5% para-deuterium were measured from 1.3 to 13 K in a Nernst-type calorimeter. Measurements of the heat capacity of normal deuterium were extended down to 0.3 K using a calorimeter partially filled with ferric alum to cool the deuterium sample by adiabatic demagnetization.

12923 The Solubility and Entropy of Solution of Iodine in Octamethylcyclotetrasiloxane and Tetraethoxysilane. Kozo Shinoda and J. H. Hildebrand. *Journal of Physical Chemistry*, v. 61, June 1957, p. 789-791.

Iodine dissolved in octamethylcyclotetrasiloxane, $(CH_3)_8Si_4O_4$, to give a violet "regular" solution, but in tetraethoxysilane, $(C_2H_5O)_4Si$, to give a solvated, brown solution. Results indicate that the entropy of solution is a function of mole fraction, not volume fraction, for quasi-spherical molecules of different size.

12924 The Liquid-Liquid Solubility of Octamethyl-Cyclo-Tetra-Siloxane With Perfluoromethylcyclohexane and Perfluoro-n-Heptane. J. E. Jolley and J. H. Hildebrand. *Journal of Physical Chemistry*, v. 61, June 1957, p. 791-793.

12925 The Kinetics of Reactions of Some Alkali Halides in the Solid State. Harold F. Mason. *Journal of Physical Chemistry*, v. 61, June 1957, p. 796-802.

The rate of reaction between solid powders was followed with X-ray measurements at about 450 C.

12926 X-Ray Diffraction Study of the Polyvinyl Alcohol-Iodine System. Masao Haisa and Hiroharu Itami. *Journal of Physical Chemistry*, v. 61, June 1957, p. 817-818.

A study on the correlation between the stretching orientation of crystallites in the polyvinyl alcohol film and the configuration of I molecules absorbed in it.

12927* Colligative Properties of Polyelectrolyte Solutions. IV. Activity Coefficient of Sodium Ion. Mitsuru Nagasawa and Ikumi Kagawa. *Journal of Polymer Science*, v. 25, June 1957, p. 61-76.

By the concurrent use of the ion exchange membrane electrode in addition to the Na amalgam electrode, the ionic activity of Na ion in salt-free polyelectrolyte solutions was determined over a wide range of sample concentration.

12928 The Effect of Aluminium Sulphate and Other Polyvalent Metals on the Viscosity of Gelatin Solutions. A. M. Kragh. *Journal of the Science of Food and Agriculture*, v. 8, June 1957, p. 351-359.

Addition of Al salts may give rise to considerable, though to some extent impermanent, viscosity increases. These effects are dependent on pH, type of gelatin, and concentration of reactants.

12929* (Russian.) Catalytic Properties of Complex Compounds of Metals. **Kataliticheskie svoistva kompleksnykh soedinenii metallov.** L. A. Nikolaev. *Khimicheskaia Nauka i Promyshlennost*, v. 2, no. 2, 1957, p. 202-209.

Study of the porphyrin complex compounds and their catalytic properties. Survey of catalytic properties of other complex compounds.

12930* (Russian.) Effect of Pressure on Viscosity of Certain Organo-Silicon Liquids in Mineral Oil Solutions. **Vliianie davleniia na viazkost' rastvorov nekotorykh kremniiorganicheskikh zhidkostei v mineral'nom masle.** M. M. Kusakov, L. A. Konovalova, and V. I. Avdeeva. *Khimiia i Tekhnologiia Topliva, i Masel*, no. 4, Apr. 1957, p. 38-41.

Dependence of viscosity of solutions of polysilicon liquids in mineral oil on pressure at various temperatures.

12931 Thermodynamic and Transport Properties of Dissociated Hydrogen Mixtures. Martin J. Reisfeld. *Los Alamos Scientific Laboratory (U. S. Atomic Energy Commission)*, LA-2123, June 1957, 23 p. (UF767 U3La Contin.)

Properties were calculated in the range 1000 to 4000 K. Equilibrium composition and specific heat data are given as functions of temperature for a number of pressures ranging from 0.1 to 100 atm. The coefficients of viscosity and binary diffusion are listed.

12932* (French.) Applying Quantitative Diffraction Methods to the Study of Crystal Growth Phenomenon in Nickel Hydroxide. **Application des méthodes quantitatives de diffraction a l'étude du phénomène de croissance cristalline dans l'hydroxyde de nickel.** Jacqueline Longuet-Escard and Jacques Méring. *Memorial des Servies Chimiques*, v. 14, 1955, p. 205-213 + 1 plate.

General characteristics of the diffraction diagrams of hydroxide. Structural data. Interference diagrams.

12933 Growth and the Breaking Strains of Certain Needle Crystals. J. E. Gordon. *Nature*, v. 179, June 22, 1957, p. 1270-1272.

Observations were made of the growth of hydroquinone crystals under conditions of fairly rapid crystallization and especially under mechanical strain.

12934* (German.) Present State of Research in the Field of Heterogeneous Catalysis. **Über den gegenwärtigen Stand der Forschung in der heterogenen Katalyse.** Karl Hauffe. *Naturwissenschaften*, v. 44, no. 10, 1957, p. 299-303.

Characteristics of various types of catalysts.

12935 Activities in the KCl-$FeCl_2$ and LiCl-$FeCl_2$ Systems. C. Beusman. *Oak Ridge National Laboratory (U. S. Atomic Energy Commission)*, ORNL-2323, June 1957, 100 p. (UF767 U3o Contin.)

Phase equilibria were studied by means of thermal analysis and vapor pressure measurements. The solid-liquid equilibria were studied by simultaneous conventional cooling curves and differential cooling curves. Petrographic and X-ray analysis helped identify the compounds K_2FeCl_4 and $KFeCl_3$. The $FeCl_2$-LiCl system showed no compounds, and consisted of continuous solid solution formation.

12936 The Inter-Diffusion of Two Charged Particles (With Particular Reference to Ion-Exchange in Zeolites). I. R. Beattie and D. R. Davies. *Philosophical Magazine*, v. 2, ser. 8, May 1957, p. 599-606.

In many cases two ions diffusing in opposite directions in a charged substrate will diffuse independently of one another apart from any space charge effects. An equation is developed relating the amount of material exchanged during a reaction with the square root of the duration of the experiment.

12937 Vapor Pressure Data for the More Common Elements. Richard E. Honig. *RCA Review*, v. 18, June 1957, p. 195-204.

Data on vapor pressures, melting and boiling points, and heats of sublimation are tabulated and plotted for 57 elements.

12938* Dipole Moments of α,ω-Disubstituted Alkanes. J. A. A. Ketelaar and N. Van Meurs. *Recueil des Travaux Chimiques des Pays-Bas*, v. 76, May 1957, p. 437-479.

The dipole moments of members of three series of α,ω-disubstituted alkanes were determined in the liquid phase using several methods of calculation. The measurements included the dibromoalkanes, glycols, and ethyl esters of the dicarboxylic acids. From the resulting moments of the dibromides it is obvious an alternating effect exists for the first members of this series with regard to the influence of temperature.

12939* (Japanese.) **Studies on the Oxy-Acid Phosphors. VI. Stannate Phosphors. VIII. Antimonate Phosphors. VIII. Calcium Halophosphate Phosphors.** Yoshihide Kotera, Tadao Sekine, and Michiko Yonemura. *Reports of the Government Chemical Industrial Research Institute, Tokyo*, v. 36, Apr. 1957, p. 115-132.

Preparation and emission spectra.

12940 The Lifetime of Hydrogen Adsorbed on a Slightly Oxidized Nickel Surface. J. Dewing and A. J. B. Robertson. *Royal Society, Proceedings*, v. 240, ser. A, June 11, 1957, p. 423-436.

Lifetimes were studied by a direct method employing a molecular beam and a rotating Ni surface on which the gas was adsorbed.

12941* (English.) **Fluorescence Emission Spectra, Fluorescence Excitation Spectra, and Absorption Spectra of Some Metal Chelates.** Charles E. White, Donald E. Hoffman, and John S. Magee, Jr. *Spectrochimica Acta*, v. 9, no. 2, 1957, p. 105-112.

Spectra for the chelates of aluminum-morin, aluminum-Pontachrome-Blue-Black R, aluminum-Acid Alizarin Garnet R, beryllium-morin, beryllium-1-4,-dihydroxyanthraquinone, beryllium-1-amino-4-hydroxyanthraquinone, thorium-1-amino-4-hydroxyanthraquinone, zirconium-flavonol, boron-benzoin, and lithium-8-quinolinol.

12942* (English.) **Infra-Red and Raman Spectra of the Diazines.** R. C. Lord, A. L. Marston, and Foil A. Miller. *Spectrochimica Acta*, v. 9, no. 2, 1957, p. 113-125.

12943* (Russian.) The Structure of Simple Matter in the Liquid State and D. J. Mendeleev's Periodic Law. **Stroenie prostykh veshchestv v zhidkom sostoianii i periodicheskii zakon D. I. Mendeleeva.** A. Z. Golik. *Ukrainskii Khimicheskii Zhurnal*, v. 23, no. 2, 1957, p. 139-145.

Shows that the relationship between viscosity, heat of vaporization, compressibility, and critical point is a consequence of the periodic law.

12944* (Russian.) Physical-Chemical Investigation of Solutions of $ZrCl_4$ and $HfCl_4$ in Methyl Alcohol. **Fiziko-khimicheskoe issledovanie rastvorov $ZrCl_4$ i $HfCl_4$ v metilovom spirte.** I. A. Sheka and B. A. Voitovich. *Ukrainskii Khimicheskii Zhurnal*, v. 23, no. 2, 1957, p. 152-158.

Effect of concentration and temperature on the density and viscosity of $ZrCl_4$-CH_3OH and $HfCl_4$-CH_3OH solutions. Effects of alcoholysis.

12945 The Heat, Free Energy, and Entropy of the Ferrate (VI) and Selenide Ions. Robert H. Wood. *University of California, Radiation Laboratory (U. S. Atomic Energy Commission)*, UCRL-3751, Apr. 1957, 56 p. (UF767 U3u)

Studies on K_2FeO_4 and H_2Se.

12946 A Study of the Reaction Rate for the Ion Exchange System Dowex-50, Calcium, and Sodium Under Flow Conditions. N. T. Anderson and F. N. Peebles. *University of Tennessee (U. S. Atomic Energy Commission)*, AECU-3462, Dec. 1956, 67 p. (UF767 U3au Contin.)

12947* (Russian.) Chemical Kinetics and Chain Reactions. **Khimicheskaia kinetika i tsepnye reaktsii.** N. N. Semenov. *Vestnik Akademii Nauk SSSR*, v. 27, Apr. 1957, p. 7-23.

Survey of the history of chain reactions. Polymerization as a good example of this type of reaction.

12948* (English.) **Study of Acid and Reductant Functions of Hydrazine Sulphate by Iodate-Iodide Mixture.** G. S. Deshmukh and M. G. Bapat. *Zeitschrift für Analytische Chemie*, v. 156, May 18, 1957, p. 269-272.

12949* (German.) Absorption and Fluorescent Spectra of Aryl-Alkali Amides. **Absorptions-und Fluoreszenzspektren von Aryl-Alkaliamiden.** Th. Förster and H. Renner. *Zeitschrift für Elektrochemie*, v. 61, no. 3, 1957, p. 340-343.

Investigation of compounds of the R-NHMe group, where Me=Li,K, etc.

12950* (German.) Absorption Spectrum and Fluorescent Quality of Concentrated Solutions of Organic Dyestuffs. **Absorptionsspektren und Fluoreszenzeigenschaften konzentrierter Lösungen organischer Farbstoffe.** Th. Förster and E. König. *Zeitschrift für Elektrochemie*, v. 61, no. 3, 1957, p. 344-348.

Effects of concentration of aqueous solutions on the absorption spectrum and fluorescence. Explanation of two maximums in the spectrum of dimers by the splitting of absorption maxima in monomers.

12951* (German.) Photochemistry of Complex Compounds of the Transition Metals. **Zur Photochemie der Komplexverbindungen der Übergangsmetalle.** H. L. Schläfter. *Zeitschrift für Physikalische Chemie (Frankfurt)*, v. 11, Apr. 1957, p. 65-77.

Attempts to characterize photochemical properties on the basis of electrostatic theory of light absorption.

12952* (German.) Disproportion Equilibrium of Titanium Trichloride. **Das Disproportionierungsgleichgewicht des titantrichlorids.** Hermann Hartmann and Günter Rinck. *Zeitschrift für Physikalische Chemie (Frankfurt)*, v. 11, May 1957, p. 213-233.

The disproportion equilibrium of $TiCl_3$ in a range of temperatures between 540 and 700 C was investigated by "freezing" the equilibrium by means of quenching.

12953* (Russian.) Heat Capacity of Laminar Lattices at Low Temperatures. **Teploemkost' sloistykh reshetok pri nizkikh temperaturakh.** E. S. Itskevich and P. G. Strelkov. *Zhurnal Eksperimental'noi i Teoreticheskoi Fiziki*, v. 32, Mar. 1957, p. 467-477.

Heat capacities of CdI_2, $CdBr_2$, and $CdCl_2$ between 1.6 and 100 K.

12954* (Russian.) The Activating Effect of Cadmium Sulfate in the Catalytic Decomposition of Hydrogen Peroxide by Potassium Chromate. **Aktiviruiushchee deistvie sul'fata kadmiia na kataliticheskoe razlozhenie perekisi vodoroda khromatom kaliia.** B. E. Rubinshtein. *Zhurnal Fizicheskoi Khimii*, v. 31, Feb. 1957, p. 292-303.

12955* (Russian.) The Physico-Chemical and Electrical Properties of the System TiO_2-ZrO_2. **Fizichesko-khimicheskie i elektricheskie svoistva v sisteme TiO_2-ZrO_2.** Ia. M. Ksendzov and V. G. Prokhvatilov. *Zhurnal Fizicheskoi Khimii*, v. 31, Feb. 1957, p. 321-327.

12956* (Russian.) A Tracer Atom Investigation of the Sequence of Principal Intermediate Product Transformations in the Liquid-Phase Oxidation of Cyclohexane. **Izuchenie posledovatel'nosti prevrashcheniia glavnykh promezhutochnykh produktov zhidkofaznogo okisleniia tsiklogeksana metodom mechenykh atomov.** I. V. Berezin, L. S. Vartanyan, B. G. Dzantiev, N. F. Kazanskaya, and N. M. Emanuel'. *Zhurnal Fizicheskoi Khimii*, v. 31, Feb. 1957, p. 340-349.

12957* (Russian.) Calculation and Interpretation of the Vibrational Spectra of Ethane and Its Deutero Derivatives. **Raschet i interpretatsiia kolebatel'nykh spektrov etana i ego deiterozameshchennykh.** I. F. Kovalev. *Zhurnal Fizicheskoi Khimii*, v. 31, Feb. 1957, p. 362-371 + 1 plate.

12958* (Russian.) The Effect of Temperature and Pressure on the Composition of Ternary Azeoptrope. **Vliianie temperatury i davleniia na sostav troinykh azeotropov.** A. V. Storonkin, A. G. Morachevskii, and L. S. Kudryavtseva. *Zhurnal Fizicheskoi Khimii*, v. 31, Feb. 1957, p. 395-402.

Azeotropic conditions at different temperatures and pressures were determined for the systems benzene-cyclohexane-isopropyl alcohol, benzene-cyclohexane-normal propyl alcohol, benzene-cyclohexane-isobutyl alcohol, and cyclohexane-ethyl alcohol-ethyl acetate.

12959* (Russian.) Diffusion of Electrolytes and the Polarographic Method. The Coefficients of Diffusion of Zn^{2+} in Aqueous Solutions of Various Concentrations of KCl and KNO_3. **Diffuziia elektrolitov i poliarograficheskii metod. Koeffitsienty diffuzii Zn^{2+} v vodnykh rastvorakh KCl i KNO_3 raslichnoi kontsentratsii.** Ia. P. Gokhshtein. *Zhurnal Fizicheskoi Khimii*, v. 31, Feb. 1957, p. 403-409.

12960* (Russian.) Thermodynamic Properties of Electrolytes in Non-Aqueous Solutions. **Termodinamicheskie svoistva elektrolitov v nevodnykh rastvorakh. III.** The Effect of Solvation on the Energy of Ions on Change in Concentration. **Vliianie sol'vatatsii na energiiu ionov pri izmenenii kontsentratsii.** N. A. Izmailov and E. F. Ivanova. *Zhurnal Fizicheskoi Khimii*, v. 31, Feb. 1957, p. 424-431.

A study of the concentration dependency of the activity coefficients of univalent electrolytes in non-aqueous solutions: LiCl, NaCl, KBr, KI, CsCl, and KNO_3 in formamide; KBr, NaCl, NaBr, and NaI in methanol; NaBr and NaI in ethanol; and NaI in *n*-butanol.

12961* (Russian.) The Decomposition Potentials of Molten Lead and Thorium Chlorides. **Napriazhenie razlozheniia rasplavlennykh khloridov svintsa i toriia.** M. V. Smirnov and L. E. Ivanovskii. *Zhurnal Fizicheskoi Khimii*, v. 31 Feb. 1957, p. 467-473.

12962* (Russian.) A Kinetic Study of the Dimerization of Cyclopentadiene. **Kineticheskoe issledovanie reaktsii dimerizatsii tsiklopentadiena.** N. I. Shuikin and T. I. Naryshkina. *Zhurnal Fizicheskoi Khimii*, v. 31, Feb. 1957, p. 493-497.

Study over the temperature range of −10 to +30 C in various solvents and in the presence of various stabilizing addition agents. Cyclopentadiene is preserved to the greatest extent at low temperatures ranging from −78 to −10 C.

12963* (Russian.) Coordination Theory and X-Ray Analysis in the Study of the Structure of Heteropoly-Compounds. **Koordinatsionnaia teoriia i rentgenostrukturnyi analiz v voprose izucheniia stroeniia geteropolisoedinenii.** E. A. Kikitina and E. V. Buris. *Zhurnal Neorganicheskoi Khimii*, v. 2, Mar. 1957, p. 510-514.

Thermographic investigation of saturated heteropolyacids.

12964* (Russian.) Molecular and Ionic Forms of Complex Compounds With Non-Metallic Center Atom. **Molekwliarnye i ionnye formy kompleksnykh soedinenii s nemetallicheskim tsentral'nym atomom.** Ia. A. Fialkov. *Zhurnal Neorganicheskoi Khimii*, v. 2, no. 4, 1957, p. 736-748.

Characteristics of complex compounds of non-metallic and intermediate elements of the III-VII periodic groups.

12965* (Russian.) Viscosity of Silicon Tetrachloride System With Oxygen-Containing Organic Substances. **Viazkost' sistem chetyrekhkhloristogo kremniia s kislorodsoderzhashchimi organicheskimi veshchestvami.** V. V. Udovenko and Iu. Ia. Fialkov. *Zhurnal Neorganicheskoi Khimii*, v. 2, no. 4, 1957, p. 868-872.

See also: **12594** (ion exchange at glass surfaces); **13201** (flow properties of suspensions); **13236** (equilibrium in gaseous systems); **13763** (molecular structure by neutron diffraction).

COATINGS

12966 Surface and Subsurface Abrasion Tests for Porcelain Enamels. James H. Giles, Jr. and J. C. Richmond. *American Ceramic Society, Bulletin*, v. 36, June 1957, p. 205-207.

Enameled metal specimens are abraded for a designated time with a charge of abrasive, stainless steel balls, and water. The percentage of initial gloss retained is taken as the index of resistance to surface abrasion, and the inverse rate of weight loss is taken as the index of resistance to subsurface abrasion.

12967 Protection of Uranium: Vapor-Deposited Coatings. I. E. Campbell, E. M. Sherwood, C. F. Powell, and R. P. Jones. *Battelle Memorial Institute (U. S. Atomic Energy Commission)*, BMI-887, Nov. 1953, 19 p. (UF767 U3b Contin.)

The most satisfactory coatings were obtained by a displacement-diffusion process similar to pack chromizing, employing the vapors of the lower Zr iodides. On small specimens, these coatings are essentially pore free, and have corrosion rates in boiling, distilled water of the order of 0.001 to 0.005 mg. per ($cm.^2$) (hr.), and have test lives, before pinhole attack occurs, averaging about 500 hr. for a coating 5 to 6 mils thick.

12968 Metal Spraying in Inert Atmospheres. R. E. Monroe, D. C. Martin, and C. B. Voldrich. *Battelle Memorial Institute (U. S. Atomic Energy Commission)*, BMI-894, Dec. 1953, 21 p. (UF767 U3b Contin.)

Zirconium coatings deposited on U by this method were porous and contained many spray particles which were not satisfactorily flattened out during deposition. A diffusion heat treatment after spraying was effective in eliminating the boundaries between individual Zr particles. Sprayed and heat-treated Zr-coatings has good adhesion to U.

12969 Surface Alloying of Uranium. H. A. Saller, J. R. Keeler, and E. S. Hodge. *Battelle Memorial Institute (U. S. Atomic Energy Commission)*, BMI-895, Jan. 1954, 17 p. (UF767 U3b Contin.)

Preparation of corrosion-resistant Zr-alloy layers on U by cementation, hydride reduction, fluoride reduction, or evaporation is not feasible. A method of bonding Zr to U using the Ni-U eutectic as a braze was developed.

12970 Solder Bonding Aluminum to Uranium. H. W. Mishler, J. T. Niemann, R. P. Sopher, and D. C. Martin. *Battelle Memorial Institute (U. S. Atomic Energy Commission)*, BMI-923, July 1954, 27 p. (UF767 U3b Contin.)

The best bonds were produced with Al plated with 0.5 mil of Cu and Ni-plated U given a Cu flash. Zinc was the most corrosion-resistant solder tested.

12971* (Dutch.) Metallic Anticorrosive Coatings for Steel Structures. **Metallische anticorrosieve deklagen voor staalconstructies.** J. F. H. van Eijnsbergen. *Bedrijf en Techniek*, v. 12, May 18, 1957, p. 346-350.

Structure and behavior of metal coatings in different media. Methods of application, especially by hot spraying and by diffusion of Zn, Al, and Cd coatings.

12972 The Mechanism of the Protection of Steel by Sprayed Aluminium Coatings. J. E. O. Mayne and D. Van Rooyen. *Chemistry & Industry*, no. 23, June 8, 1957, p. 718-721.

In sea-water the rate of attack on the Al is sufficiently fast for the steel to be cathodically protected. In tap-water no evidence for cathodic protection was obtained and protection may be due to the blockage of pores in the sprayed coating.

12973 Control of Corrosion With Zinc Coatings. J. L. Kimberley. *Corrosion*, v. 13, June 1957, p. 385t-391t.

A history of the uses of metallic Zn and Zn coatings to control corrosion is outlined briefly with some consideration being given to the theory under which Zn is protective to steel. The following methods of application of Zn are discussed in detail: hot dip, metallizing, sherardizing, and painting. The relative merits and weaknesses of Zn coats are considered with case histories being cited to show the fields of usefulness of such coatings.

12974 Coal Tar Coatings for Protection of Underground Structures. Norman T. Shideler. *Corrosion*, v. 13, June 1957, p. 392t-396t.

The history of the use of coal tar coatings for the protection of underground structures is discussed briefly. Specifications are given for the following hot applied coatings; narrow range, moderate range, and wide range enamels, AWWA enamel C 203-4, and hot pipeline enamel. Temperature ranges at which these coatings can best be used are shown graphically. Recommendations are made regarding the selection of a coating for a given underground condition.

12975 Progress in Prevention of Corrosion in Naval Aircraft. S. L. Chisholm and N. N. Rudd. *Corrosion*, v. 13, July 1957, p. 473t-480t.

Thin resin and lacquer films have exhibited good metal adherence and excellent resistance of protected parts to marine weathering.

12976* (French.) Metal Spraying as an Anticorrosive Process. **La métallisation par projection dans la lutte contre la corrosion.** M. Cauchetier. *Corrosion et Anticorrosion*, v. 5, May 1957, p. 156-159.

A review of the various metals used in spraying and uses of the metallized articles.

12977 Industrial Finishes. Formulation and Performance. J. Macrae. *Corrosion Technology*, v. 4, June 1957, p. 183-188.

Surface preparation and application methods. Formulation and performances of stoving enamels and cold-curing and air-drying finishes.

12978 Defunctionalizing Technique for Producing Epoxy Resin-Phthalic Alkyds. George R. Somerville and Donald S. Herr. *Industrial and Engineering Chemistry*, v. 49, July 1957, p. 1080-1084.

Resins of relatively high phthalic anhydride content combine the desirable properties of both components for use in surface coatings.

12979* (French.) Outline of the Studies of the Fourth ABEM Commission in the Field of Sea-Water Corrosion. **Aperçu des travaux de la Commission IV de l'A. B. E. M. dans le domaine de la corrosion marine.** J. Depireux. *Industrie Chimique Belge*, v. 22, Apr. 1957, p. 379-392.

Influence of various states of steel surface on behavior of a typical paint, applied with or without a wash-primer. Influence of time between application of primer and of paint. Performance data on various kinds of anticorrosion and anti-fouling paint.

12980* Insulation Engineering Fundamentals. XVIII. Use of Insulating Varnishes. Graham Lee Moses. *Insulation*, v. 3, July 1957, p. 10-14.

Varnish properties, tests, and applications; treatment of coils; treating wound apparatus.

12981 Steam Treat Tools for Longer Shop Life. F. L. Spangler and M. E. Lackey. *Iron Age*, v. 179, June 27, 1957, p. 106-108.

Steam treating increases tool life by putting a controlled oxide film on tool surfaces.

12982 For Coatings That Last, Get Base Metals Clean. S. J. Oechsle, Jr. and K. G. LeFevre. *Iron Age*, v. 180, July 11, 1957, p. 95-98.

Your money's worth in a tank lining depends primarily on one thing: proper surface preparation of the base metal.

12983* (Russian.) Electrical Properties and the Real Structure of Germanium Single-Crystal Films Obtained by Evaporation Under Vacuum. **Elektricheskie svoistva i real'naia struktura monokristal'nykh plenok germaniia, poluchennykh ispareniem v vakuume.** G. A. Kurov, S. A. Semiletov, and Z. G. Pinsker. *Kristallografiia*, v. 2, no. 1, 1957, p. 59-63 + 1 plate.

The monocrystalline character of the Ge film obtained by vapor deposition on hot monocrystal Ge was determined by electron microscopy. The electrical properties of the film point to the presence of a great number of defects in its structure.

12984* Vacuum Metallizing—A Complementary or Competitive Finishing Technique? D. J. Fishlock. *Mechanical World and Engineering Record*, v. 137, June 1957, p. 250-257.

The evaporation process; applications; continuous coating of strip materials; vacuum evaporation in optical work; conducting films on non-metals; vacuum or cathode sputtering; physical properties of vacuum coatings.

12985* Usefulness of the Nitroparaffins and Other Derivatives in the Protective Coatings Industry. J. S. Long and Earl R. Gerhard. *Official Digest. Federation of Paint and Varnish Production Clubs*, v. 29, June 1957, p. 542-559.

Preparation and reactions of epoxy resins; use of nitroparaffins in solvent mixtures for epoxies. Solvent and film properties of epoxy solutions; drying rates.

12986* Latest Vinyl Copolymer Formulating Techniques. Felix Liberti. *Official Digest. Federation of Paint and Varnish Production Clubs*, v. 29, June 1957, p. 560-571.

12987 Car-Body Painting. D. H. Lloyd. *Oil & Colour Chemists' Association, Journal*, v. 40, June 1957, p. 433-455.

Improved coating materials now permit continuous-conveyor painting at greatly reduced costs. Each progressive step, however, is achieved only with considerable expenditure on plant and equipment and is accompanied by loss of flexibility in production. Paint defects are held to a minimum by simplifying the painting schedule and by using a plant controlled by an integrated instrument system.

12988 Finishes for Heating Appliances: Epoxide Paint and Vitreous Enamel Compared. N. S. C. Millar. *Oil & Colour Chemists' Association*, Journal v. 40, June 1957, p. 478-487.

Reviews briefly the chemistry of epoxide-based finishes and describes the general structure and manufacture of vitreous enamel. The properties of an epoxide/u.f. resin system and vitreous enamel are compared with particular reference to their requirements when applied to domestic heating appliances.

12989 The Action of Solvents on Drying-Oil Films. II. N. Stolow. *Oil & Colour Chemists' Association, Journal*, v. 40, June 1957, p. 488-499.

The diffusion processes in supported drying (linseed) oil films were studied by investigation of the rates of swelling and shrinking by solvent. The solution of Fick's law for a semi-infinite solid could be applied and a linear relation between the amount of swelling and the square root of the time was obtained for most of the process, except in the region of high swelling.

12990* New Airless Finishing Method. John Starr. *Organic Finishing*, v. 18, June 1957, p. 4-6.

Method permits safe deposition of finishing materials on surfaces as far as ten ft. away from the nozzle of a spray gun.

12991* The Significance of Colour Measurement. Practical Applications of Scientific Developments. E. Atherton. *Paint Manufacture*, v. 27, June 1957, p. 213-216.

Correlation of physical effects with numerical techniques of measurement.

12992* The Hiding Power of White Pigments. F. Munk. *Paint Manufacture*, v. 27, June 1957, p. 217-222.

The two-constant theory of Kubelka and Munk which relates reflectivity and the coefficient of scatter is derived and experimental evidence for its validity is provided.

12993 Using Hypalon in Coatings. Douglas J. Kelly. *Paint, Oil & Chemical Review*, v. 120, June 27, p. 10-12.

Synthetic elastomer combines the flexibility, strength, extensibility, abrasion resistance, and relative chemical inertness normally found in rubber-like materials with a relative ease of formulation.

12994 Surfactants in the Paint and Allied Industries. C. D. Moore and Maurice Bell. *Paint Technology*, v. 21, June 1957, p. 199-203.

Properties; the phenomena of surface activity; applications in oil-bound paints, emulsion coatings, and miscellaneous other materials.

12995* Behavior of Paint Systems Under Ultraviolet Radiation. Max Kronstein. *Paint and Varnish Production*, v. 47, June 1957, p. 25 + 9 pages.

Data on solution coatings, water emulsion coatings, and modified water emulsion coatings.

12996 Metallic Smokes. An Electron Microscope Examination of Aerosols Produced by Evaporation of Metals in Helium. Paul H. Till and John Turkevich. *Princeton University (U. S. Atomic Energy Commission)*, NYO-3435, Jan. 1956, 74 p. (UF767 U3ny)

The metals studied were Cu, Ag, Au, Al, As, Sb, Bi, Mn, U, Mg, Cd, and Zn.

12997* The Vitreous Enamelling of Aluminum. *Product Finishing*, v. 10, June 1957, p. 95-103.

Formulation and firing of enamels. (To be continued.)

12998 Protective Painting of Structural Steel. F. Fancutt and J. C. Hudson. 102 p. 1957. Macmillan Co., New York. (TA467 F21p)

Summary of recent practical experiments emphasizes the important correct surface preparation for protection against atmospheric corrosion. Choice of paints and painting procedure are also vital factors.

12999* Recent Developments in Epoxide Resins for Surface Coating Applications. John Nicol. *Rubber and Plastics Age*, v. 38, June 1957, p. 539.

13000 Metal Coating Research at the Sketty Hall Laboratories of the British Iron and Steel Research Association. S. S. Carlisle. *Sheet Metal Industries*, v. 34, June 1957, p. 405-420.

Describes work of the laboratory on surface preparation, surface physics, coatings by electro-deposition and allied methods, organic coatings, hot-metal coating practice, investigation of the properties of coatings, and strip processing technology.

13001* (Russian.) Diffusion Chrome Plating of Wood-Cutting Tools. **Diffuzionnoe khromirovanie derevorezhushchego instrumenta.** A. P. Polishchuk. *Stanki i Instrument*, v. 28, Apr. 1957, p. 29-30.

Chrome plating improves the quality of wood-cutting tools. Best results were obtained in the case when the thickness of chrome coating was 10 to 15μ.

13002 How to Cut Galvanizing Costs. E. R. Hauser. *Steel*, v. 141, July 8, 1957, p. 108.

Quality can be improved and costs reduced by proper design and fabricating practices.

13003 Preparation of Protective Coatings by Electrophoretic Methods. Allen C. Werner, James J. Shyne, Harold N. Barr, and Bernard Triffleman. *Wright Air Development Center, Materials Laboratory, WADC Technical Report* 56-521, Apr. 1957, 46 p. (TL507 Un3.18w Vis.)

Studies on protection of Mo and graphite. Multilayer coatings of 80% Ni-20% Cr and Ni-bonded Cr_3C_2 provided good static air-oxidation resistance. Inclusions of a 50% dense Ni-Cr layer resulted in satisfactory ballistic impact resistance. Erosion was fair.

13004 High Temperature Protective Coatings for Magnesium. Clyde R. Fitzgibbon, Edward H. Miller, and Milton A. Glaser. *Wright Air Development Center, Materials Laboratory, WADC Technical Report* 56-622, Apr. 1957, 104 p. (TL507 Un3.18w Vis.)

Preferred system is based on an epoxy-polyamide vehicle; it consists of a calcium chromate pigmented primer, containing 35% pigment and an aluminized topcoat. Alternate systems are based on a styrenated acrylonitrile modified alkyd-silicone copolymer resin and a mixture of an epoxy ester and a silicone resin.

13005* (German.) Discontinuous Suboxide Coating of Copper. **Die diskontinuierliche Oxydulbedeckung von Kupfer.** E. Menzel, W. Stössel, and Chr. Menzel-Kopp. *Zeitschrift für Naturforschung*, v. 12a, May 1957, p. 404-409 + 2 plates.

Preparation of suboxide crystals on Cu by the method of thermic oxidation. Observation of their growth and explanation of their character.

See also: **13068** (oxide coating on tungsten); **13400** (corrosion in domestic water heaters); **13476** (phosphate coatings); **13479** (surface preparation for painting); **13518** (steam treatment of alloys); **13578** (sputtered Au films); **13630** (vapor deposition of Cd).

CONTROL SYSTEMS, COMPUTERS, AND SYSTEMS ENGINEERING

13006* Random Access to Data Improves Information Processing. *Automation*, v. 4, July 1957, p. 71-81.

Memory systems for storing information are keys to keeping pace with production operations. IBM's RAMAC, Electrodata's Datafile, and Potter's RAM are described.

13007* (Russian.) Stabilizing Systems of Automatic Control by Means of a Special Signal. **Stabilizatsiia sistem regulirovaniia pri pomoshchi spetsial'nogo signala.** R. Ol'denburger. *Avtomatika i Telemekhanika*, v. 18, May 1957, p. 392-396.

Linear automatically controlled systems with two or more dominant lags can be stabilized by the introduction of noise, or a signal of sufficiently H.F. components, provided that the hunt of the system is not excessively severe. The amplitude of the signal must be enough to run an element, such as a governor pilot valve, through its full stroke.

13008* (Russian.) The Synthesis of Linear Servo Systems Using the Criterion of Minimum of Practically Critical Reproduction Error. **Sintez lineinykh slediashchikh sistem na osnove kriteriia minimuma prakticheski predel'noi oshibki vosproizvedeniia.** K. I. Kurakin. *Avtomatika i Telemekhanika*, v. 18, May 1957, p. 409-426.

Optimum transfer function of a servo system is defined for the case when the input reproducing magnitude is a given slow-changing time-function and when noise is evenly distributed along the whole spectrum of operation frequencies. The synthesis of the system is based on using the criterion of minimum of practically critical tracking error.

13009 Dynamics of Electronic Self-Balancing Systems. G. R. Jacob. *Communication and Electronics*, no. 30, May 1957, p. 166-174.

The Laplace transformation is applied to the analysis of the dynamic response of the industrial self-balancing potentiometer.

13010 Advanced Data System in the Power Industry. G. M. Keyser and J. R. Leslie. *Communication and Electronics*, no. 30, May 1957, p. 206-210.

Describes device to log operations during breakdown and restoration of power facilities.

13011 Transmitting Data by Light Modulation. Martin M. Decker and Hans Mueller. *Control Engineering*, v. 4, July 1957, p. 63-66.

System permits modulation of very strong light beams, so that transmissions over 10 or 20 miles are practical.

13012 Selecting Loops for Critical Control. A. H. McKinney. *Control Engineering*, v. 4, July 1957, p. 67-72.

A middle-of-the-road procedure for finding out how many properties must be controlled and what variables to manipulate.

13013 Force-Reflecting Servos Add "Feel" to Remote Controls. J. R. Burnett. *Control Engineering*, v. 4, July 1957, p. 82-87.

Four-terminal network analogy in the analysis and synthesis of force-reflecting servo remote manipulators.

13014 How Input/Output Units Affect Data-Processor Performance. James Gibbons. *Control Engineering*, v. 4, July 1957, p. 97-102.

The importance of input/output units in over-all evaluation.

13015 The Inductosyn and Its Application to a Programmed Co-Ordinate Table. I. L. H. R. Harrison, B. A. Horlock, and F. D. Hunt. *Electronic Engineering*, v. 29, June 1957, p. 254-259.

"Inductosyn" is a new control element capable of indicating angular position to an accuracy of 5 sec. of arc with a repeatability of 1 sec. in its rotary form, and capable of a positional accuracy better than 0.0001 in. with a repeatability of 25μ in. in its linear form. (To be continued.)

13016* (Czech.) Servosimulator. **Servosimulátor.** Vítězslav Pěnka and Čeněk Tichý. *Elektrotechnický obzor*, v. 46, May 1957, p. 241-245.

Fundamental properties of the calculating units of d.c. analog computers. Method of programming linear differential equations. Details of small computer "Servosimulator ÚVR".

13017* A Two Dimensional Ferrite-Core Memory. M. M. Farooqui, S. P. Srivastava, and R. N. Neogi. *Indian Academy of Sciences, Proceedings*, v. 45, sec. A, Apr. 1957, p. 240-252 + 2 plates.

A unit consisting of 100 words of 11 binary digits each was constructed for parallel operation. The word drive is from a biased switch-core matrix, while the digit drive makes use of pulse transformers. Logic and circuit techniques enable high discrimination between wanted and unwanted signals.

13018 Error Rates in Pulse Position Coding. L. Lorne Campbell. *Institute of Radio Engineers, Transactions on Information Theory*, v. IT-3, Mar. 1957, p. 18-24. (TK1 In6.6it Vis.)

An expression for the error rate in a system using a binary pulse position code is derived.

13019 First-Order Markov Process Representation of Binary Radar Data Sequences. George C. Sponsler. *Institute of Radio Engineers, Transactions on Information Theory*, v. IT-3, Mar. 1957, p. 56-64. (TK1 In6.6it Vis.)

13020 Automatic Bias Control for a Threshold Detector. J. Dugundji and E. Ackerlind. *Institute of Radio Engineers, Transactions on Information Theory*, v. IT-3, Mar. 1957, p. 65-70. (TK1 In6.6it Vis.)

13021 A Survey of Progress Reported During 1955 in Telemetry and Remote Control. Kenneth M. Uglow. *Institute of Radio Engineers, Transactions on Telemetry and Remote Control*, v. TRC-3, May 1957, p. 9-13. (TK1 In6.6r Contin.)

13022 System for Rapid Reduction of Telemetric Data. E. Donald Heberling. *Institute of Radio Engineers, Transactions on Telemetry and Remote Control*, v. TRC-3, May 1957, p. 23-25. (TK1 In6.6r Contin.)

Details of automatic data reduction equipment.

13023 Plug-In Unit Controls Amplifier Gain Automatically. Z. P. Azary and C. S. Simons. *Instrumentation*, v. 10, May-June 1957, p. 18-21.

Automatic gain control unit for Brown servo amplifier permits operation of servo motor from input signals that vary from 1.2μ v. to 1.5 v.

13024 Digital Differential Analyzers. Martin L. Klein, Frank K. Williams, Harry C. Morgan, and Shigeru Ochi. *Instruments and Automation*, v. 30, June 1957, p. 1105-1109.

A clear and simple description of the principles of operation of a digital differential analyzer.

13025 Combined Analog and Digital Systems — Why, When, and How. John H. McLeod and Robert M. Leger. *Instruments and Automation*, v. 30, June 1957, p. 1126-1130.

Analysis of the largest combined analog-digital system yet undertaken.

13026 Methods of Improving Servo-System Performance. II. J. M. Nightingale. *Machine Design*, v. 29, June 13, 1957, p. 142-147.

Combating shortcomings of closed-loop systems by using velocity, acceleration, and transient-velocity feedbacks.

13027 Project Whirlwind Summary Report No. 48, Fourth Quarter 1956. *Massachusetts Institute of Technology, Office of Naval Research Contract* N5ori60, Oct.-Dec. 1956, 41 p. (TK7872.C5 M38p Contin.)

Progress reports on 68 problems run on the Whirlwind I high-speed digital computer.

13028* Planning an Electronic Computer System. L. E. Sandford. *Petroleum*, v. 20, July 1957, p. 249-251.

Outlines some applications in the oil industry.

13029 A High-Speed Uniselector for Automatic Telephone Exchanges. J. M. Unk. *Philips Technical Review*, v. 18, no. 12, 1956/57, p. 349-357.

New method of coupling uniselector to a common driving system makes it possible to bring the selector to a stop, against the desired outlet, from a speed of rotation of 300 outlets per sec. This speed permits the adoption of novel wiring schemes whereby wear is considerably reduced.

13030* Phase-Plane Methods in Process Control System Design. G. D. S. MacLellan. *Society of Instrument Technology, Transactions*, v. 9, June 1957, p. 62-71.

Application to determination of the exact form of response of a hydraulic relay device subject to large inertia loads; the effect of "hysteresis" in a simple level-control system due to dead zone in the float and dead zone in the control valve; and effect of dead time, or delay, in a system with proportional control.

13031 Split-Word Floating-Decimal Routine. Karl O. Malmquist, Jr. *University of California, Radiation Laboratory (U. S. Atomic Energy Commission)*, UCRL-4714, June 1956, 26 p. (UF767 U3u Contin.)

Pseudo code will reduce to a minimum the required coding space of a data-processing machine-type-650 problem, using floating-decimal arithmetic.

13032* Superconductivity. A Cold Outlook for Computers. *Wireless World*, v. 63, July 1957, p. 326-330.

A simplified discussion of a cryotron tube.

See also: **13086** (telemetering encoder); **13094** (electronic computers); **13099** (transfluxer characteristics); **13108** (remote control systems); **13110** (multiplexer for telemetering); **13284** (computer for boiler evaluation); **13285** (heat exchanger simulator).

ELECTRICAL ENGINEERING

13033* (English.) **Conduction of Electricity Through Ice and Snow. I. Discharge of a Condenser Through Ice Crystals. II. Current Through a Circuit With Ice Crystal Inserted.** Reinhards Siksna. **III. Current Through Snow and Distribution of Potential in a Snow Sandwich.** Reinhards Siksna and Arvids Metnieks. **IV. Time Variations of the Current Through a Snow-Ice Sandwich and Potential Distribution in It in Dependence on the Electric Treatment With Unipolar Potential.** Reinhards Siksna. *Arkiv för Fysik*, v. 11, no. 6, 1957, p. 495 + 44 pages.

13034* (German.) Electrical Rolling-Mill Drives With Amplidyne and Rectifier Controlling Mechanisms. **Elektrische Walzwerksantriebe mit Amplidyne- und Stromrichtersteuerung.** H. Opitz. *Berg- und Hüttenmännische Monatshefte der Montanistischen Hochschule in Leoben*, v. 102, Apr. 1957, p. 77-83.

Several examples are given describing applications of this equipment and its importance in post war German metallurgy.

13035 Applying Magnetic Amplifiers. W. F. Eagan. *Blast Furnace and Steel Plant*, v. 45, June 1957, p. 618-625.

Correlation of basic theory with control of power equipment in rolling mills and other manufacturing plants.

13036 Phenomena Accompanying Transient Low-Voltage Discharges in Liquid Dielectrics. II. Cathode Phenomena at Low Currents. Everard M. Williams and Richard E. Smith. *Communication and Electronics*, no. 30, May 1957, p. 93-97.

Problem applies to electric-spark machining techniques.

13037* (Russian.) Steady-State Stability of a Transmission System With Controlled Synchronous Condensers at Regional Substations. **Staticheskaia ustoichivost' peredachi s reguliruemymi sinkhronnymi kompensatorami na promezhutochnykh podstantsiiakh.** N. I. Sokolov. *Elektrichestvo*, no. 5, May 1957, p. 25-30.

Advantages of synchronous condensers in a transmission system; theory and practical applications.

13038* (Russian.) α, β, and γ-Radiation and the Dielectric Strength of Compressed Air. **α-, β- i γ-izlucheniia i elektricheskaia prochnost' szhatogo vozdukha.** M. I. Sysoev. *Elektrichestvo*, no. 5, May 1957, p. 56-59.

Effect of radiation on dielectric properties of air at 1 to 15 atm. pressure.

13039* (Czech.) Filter Reactance Coils. **Filtrační tlumivky.** Bedřich Paderta. *Elektrotechnický Obzor*, v. 46, May 1957, p. 248-253.

Deals with a presaturated simple magnetic circuit with an air gap. The derived relations may be advantageously applied to the design of large filter reactance coils.

13040* (German.) Testing of Insulating Materials and Insulating-Material Combinations. **Funktionsprüfung von Isolierstoffen und Isolierstoff-Kombinationen.** Franz Hillebrand. *ETZ, Elektrotechnische Zeitschrift*, v. 78, Ausgabe A, June 1957, p. 375-377.

Methods for determining durability and temperature stability characteristics.

13041* The Absolute Calibration of Voltage Transformers. W. K. Clothier and L. Medina. *Institution of Electrical Engineers, Proceedings*, v. 104, pt. A, June 1957, p. 204-214.

13042 Introduction to Electrical Applied Physics. N. F. Astbury. 241 p. 1957. Philosophical Library, New York. (QC 518 As81i)

The classical bases of electrical science are reviewed, with specific reference to electric and magnetic fields, electrical units and general equations, electric and magnetic circuits, electromechanical and electroacoustical systems, electron devices and electromagnetic waves and radiation.

13043 Voltage-Stabilizing Transformers. David E. Musgrave. *Machine Design*, v. 29, June 13, 1957, p. 124-129.

Basic factors to be considered in the selection and application of built-in transformer units designed to maintain constant voltage output under varying input conditions.

13044 How to Choose Electric Dynamometers for Research and Development. P. S. Potts and P. T. Schuermann. *Machine Design*, v. 29, June 27, 1957, p. 102-108.

Mechanical and electric features of various types of dynamotors.

13045 Applying Flexible Printed Circuits in Electronic-Equipment Design. George Voida. *Machine Design*, v. 29, July 11, 1957, p. 124-131.

Types of materials and their commercial availability, conductor-laminate bond-strength properties, shaping characteristics, and processing and operation stability.

13046* (German.) Theory of Two-Phase Networks. **Theorie der Zwie-Phasen-Netzwerke.** G. Wunsch. *Nachrichtentechnik*, v. 7, May 1957, p. 200-204.

Describes various types of two-phase networks and discusses the principles involved in their operation.

13047* Stray-Current Losses in Stranded Windings of Transformers. H. J. Kaul. *Power Apparatus and Systems,* no. 30, June 1957, p. 137-149.

Considering various types of stranding, this paper gives equations and charts for the circulating-current loss in a number of different coil constructions as well as for the eddy current loss.

13048* Induced Losses in Steel Plates in the Presence of an Alternating Current. W. G. Deuring. *Power Apparatus and Systems,* no. 30, June 1957, p. 166-173.

It is shown that loss is not a function of current squared when considering steel alone, but is a function of current to a power less than two, with the power a function of conductor-to-plate spacing.

13049* Loading of Sealed Dry-Type Transformers. L. C. Whitman. *Power Apparatus and Systems,* no. 30, June 1957, p. 214-223.

The winding temperature rises of a representative sealed dry-type transformer are measured for a variety of loads following several steady-state conditions.

13050* Harmonics of the Salient-Pole Synchronous Machine and Their Effects. II. Synchronous Torques. M. M. Liwschitz-Garik. *Power Apparatus and Systems,* no. 30 June 1957, p. 275-281.

The derived equations are applied to a synchronous motor whose synchronous torques prevented it from starting.

13051* The Calculation of Can Losses in Canned Motors. R. C. Robinson, I. Rowe, and L. E. Donelan. *Power Apparatus and Systems,* no. 30, June 1957, p. 312-315.

Effect of end-ring resistance and slot ripple on can loss. Derivation of stator-can loss from fundamental flux-cutting theory.

13052* Induction Motor Speed-Torque-Current Curves With a Constant Rotor Temperature. R. F. Horrell and W. E. Wood. *Power Apparatus and Systems,* no. 30, June 1957, p. 343-347.

The average exponential values which express the rate of change of torque with respect to voltage and current may be determined from a locked-rotor saturation curve or from a speed-torque-current test.

13053* Eddy Currents in the End Portion of Turbine-Generator Stator Windings. G. W. Staats. *Power Apparatus and Systems,* no. 30, June 1957, p. 384-392.

Calculation of flux density in the end region; calculation of eddy current loss from flux density and of full-load eddy current loss in coil ends of a test machine.

13054 Multispeed Motors. R. Dineen. *Product Engineering,* v. 28, June 1957, p. 140-144.

Typical loads, starting torques, and currents for 2,3, or 4-speed constant-torque, variable-torque, and constant-hp. motors; relative sizes and costs, and mechanical and electrical characteristics.

13055* Dielectric Absorption in Solids and Liquids. J. S. Dryden and R. J. Meakins. *Reviews of Pure and Applied Chemistry,* v. 7, Mar. 1957, p. 15-54.

A review of absorption mechanisms and dielectric properties of various types of compounds.

See also: **12496** (electric equipment for greenhouses); **12603** (glass fiber products); **12980** (insulating varnishes); **12983** (properties of Ge films); **13010** (automatic logging of power system operation); **13167** (applications of Al); **13243** (point discharge currents); **13248** (gas-discharge mesaurements); **13295** (turbine-generator gland seals); **13408** (corrosion in steam generating stations); **13790** (generator reserve calculations); **13828** (superconductivity theory); **13933** (load characteristics of heat pumps); **13934** (a.c. systems for residential air conditioning).

ELECTROCHEMISTRY

13056 Electrode Potential Studies of Liquid-Solid Equilibrium in Zn-Cd and Zn-In Alloys. R. W. Bohl and V. D. Hildebrandt. *American Chemical Society, Journal,* v. 79, June 5, 1957, p. 2711-2717.

Thermodynamic properties of liquid alloys were determined by measurement of electrode potentials of galvanic cells from 420 to 530 C.

13057 Determination of the Specific Surface of Porous Electrodes by Methods of Capacitance Measurement. O. S. Ksendov and V. V. Stender. *Henry Brutcher Translation No.* 3887, 9 p. (From *Doklady Akademii Nauk SSSR,* v. 106, no. 3, 1956, p. 487-490.) Henry Brutcher, Altadena, Calif.

Principles are based on data obtained by charging and polarization with an a.c.

13058 Standard Potentials in Aqueous Organic Media. A General Discussion of the Cell H_2(Pt) [HCl] AgCl-Ag. D. Feakins and C. M. French. *Chemical Society, Journal,* June 1957, p. 2581-2589.

Relations for the standard potential of the cell H_2 in various media are reviewed. A new stoicheiometric relationship is developed, based on a simple treatment of ion solvation in liquid mixtures.

13059 The Overpotential of the Magnanese Dioxide Electrode. II. Acid Electrolytes. Shiro Yoshizawa and W. C. Vosburgh. *Electrochemical Society, Journal,* v. 104, July 1957, p. 399-406.

The overpotential of electrodes prepared by electrodeposition on graphite was measured in solutions of H_2SO_4 and Mn (II) and Na sulfates as a function of acidity, current density, and temperature.

13060 Ionic Conductivity of Anodic Films at High Field Strengths: Transient Behavior. D. A. Vermilyea. *Electrochemical Society, Journal,* v. 104, July 1957, p. 427-433.

13061 Electrolytic Production of Bromates. Takasi Osuga and Kiichiro Sugina. *Electrochemical Society, Journal,* v. 104, July 1957, p. 448-451.

Production of K and Na bromates using a pure PbO_2 anode.

13062 Impedance at Polarized Platinum Electrodes in Various Electrolytes. James N. Sarmousakis and Manfred J. Prager. *Electrochemical Society, Journal,* v. 104, July 1957, p. 454-459.

Results of a.c. bridge measurements of the impedances of bright Pt in contact with 1*N* aqueous solutions of KCl, KBr, and KI as functions of polarizing voltage and a.c. frequency.

13063 Anodic Oxide Films. Influence of the Film Present Before Anodization. Lawrence Young. *Faraday Society, Transactions,* v. 53, June 1957, p. 841-847.

13064 Electrowinning of Uranium From Its Oxides. II. A Preliminary Engineering Evaluation. L. W. Niedrach and A. C. Schafer. *Knolls Atomic Power Laboratory (U. S. Atomic Energy Commission),* KAPL-1668, Apr. 1957, 32 p. (UF767 Un3.1ka Contin.)

Flowsheet; operating conditions for the electrolysis cells; equipment; plant layout and operation; cost estimates.

13065 Plating Plant Layout. *Metal Industry,* v. 90, May 31, 1957, p. 463-467.

Essentials for efficient location of plant equipment. An example of a good arrangement.

13066* (German.) Hardness of Silver Electrodeposits. **Über die bleibende Härte galvanischer Silberniederschläge.** J. Fischer. *Metall,* v. 11, June 1957, p. 485-490.

Study of the factors which increase or decrease the hardness of Ag plate.

13067* (German.) Anodic Treatment of Aluminum. **Zur Frage der Glanzeloxierung des Aluminiums.** W. Helling and H. Neunzig. *Metall,* v. 11, June 1957, p. 490-498.

Alteration of Al surface by chemical and anodic polishing as well as by mechanical methods.

13068* (German.) Forming of an Oxide Layer on Tungsten. **Beitrag zur Oxydschichtbildung auf Wolfram.** H. J. Boosz. *Metall,* v. 11, June 1957, p. 511-515.

Behavior of W in electrolytic and thermic oxidation, and importance of preliminary treatment of the surface of the metal before oxidation.

13069* Some Properties of Oxide Layers Produced on Aluminium by Electrolytic Oxidation. W. Ch. van Geel and B. J. J. Schelen. *Philips Research Reports*, v. 12, June 1957, p. 240-248.

Thickness, dielectric constant, and density measurements. Layer is mainly amorphous Al_2O_3, made up of O atoms arranged in a closed-packed lattice, which is often, but need not necessarily be, cubic.

13070 The Initial Stages of Growth of Thin Metal Films on a Silver Single-Crystal Substrate. R. C. Newman. *Philosophical Magazine*, v. 2, ser. 8, June 1957, p. 750-760.

Layers of Pb, Tl, Ag, Au, Ni, Sn, and Sb were deposited onto smooth (111) surfaces of Ag single crystals.

13071* Automatic Silver Plating of Wire. *Product Finishing*, v. 10, June 1957, p. 58-62.

A general description.

13072 Etching Stainless Steel by the Electrolytic Method. W. E. McFee. *Products Finishing*, v. 21, July 1957, p. 42-43.

A simple method requiring a minimum of equipment.

13073* (Russian.) Additions of Surface-Active Materials During Electrolytic Refining of Copper. **O dobavkakh poverkhnostno aktivnykh veshchestv pri elektroliticheskom rafinirovanii medi.** N. B. Pleteneva and T. V. Globa. *Tsvetnye Metally*, v. 30, Apr. 1957, p. 32-37.

Review of published data and experience in various Soviet plants.

13074* (Russian.) Magnetic Field and Surface Condition of Molten Metal in an Electrolytic Bath. **Magnitnoe pole i sostoianie poverkhnosti rasplavlennogo metalla v elektroliznoi vanne.** M. F. Dogramadzhi and V. N. Rudakov. *Tsvetnye Metally*, v. 30, May 1957, p. 50-54.

Experimental data on the magnetic field at various portions of an electrolytic bath, and irregularities in the surface of the melt, help to clarify the problem of correct selection of currrent leads and optimum power.

13075 Anodic Oxidation of Zirconium at Low Potentials. Effect of Electrolyte Composition. George B. Adams, Jr., Curtis E. Borchers, and Pierre Van Rysselberghe. *University of Oregon (U. S. Atomic Energy Commission)*, AECU-3432, Mar. 1957, 21 p. (UF767 Un3au Contin.)

A weak, non-complexing electrolyte is best; it should be presaturated with the metal oxide by anodyzing the metal in the electrolyte at an elevated temperature.

13076* (Russian.) Electrode Potentials of Metals in Melted Salts. **Electrodnye potentsialy metallov v rasplavlennykh soliakh.** Iu. K. Delimarskii. *Uspekhi Khimii*, v. 26, Apr. 1957, p. 494-515.

Survey of the literature. Difficulties in establishing electrode potentials without having a universally adapted neutral electrode as a comparison standard.

13077* (Russian.) The Mechanism of Electrochemical Polishing of Metals. **O mekhanizme protsessa elektrokhimicheskogo polirovaniia metallov.** S. Ia. Grilikhes and N. P. Fedot'ev. *Zhurnal Prikladnoi Khimii*, v. 30, no. 4, Apr. 1957, p. 528-533.

Effects of the CrO_3 content of the electrolyte (65% H_3PO_4, 15% H_2SO_4, and up to 6% CrO_3) on the smoothing and the reflective capacity of test specimens of C steel.

See also: **13414** (overvoltage of Pb and Pb-Sb alloys); **13476** (anodizing Al); **13657** (structure of Ag electrodeposits); **13658** (structure of Ni plate); **13665** (anodizing of Zr alloys); **13905** (fume exhaust systems).

ELECTRONICS

13078* (German.) Space Charge Waves in a Finite Magnetic Field at the Cathode of a Cylindrical Electron Beam. **Raumladungswellen bei endlichem Magnetfeld an der Kathode einer zylindrischen Elektronenströmung.** Roland Liebscher. *Archiv der Elektrischen Übertragung*, v. 11, May 1957, p. 214-221.

Plasma wavelengths is calculated under the assumption of a finite magnetic focusing field at the cathode.

13079* The Janet Communication System. G. W. L. Davis. *British Communications & Electronics*, v. 4, July 1957, p. 402-407.

New system of long-distance communication uses the ionized trails of meteors as a reflecting medium, and has the outstanding advantages that it rqeuires a low transmitting power and is free from interference from aurora borealis, sporadic E, and magnetic storms.

13080* The Properties of Semi-Conductor Devices. A. A. Shepherd. *British Institution of Radio Engineers, Journal*, v. 17, May 1957, p. 255-273.

Properties of semi-conducting crystals; Ge and Si junction rectifiers; junction transistors; semi-conductor photocells.

13081* The Design of Phase-Linear Intermediate-Frequency Amplifiers. A. van Weel. *British Institution of Radio Engineers, Journal*, v. 17, May 1957, p. 275-286.

Data for the design of I.F. amplifiers with flat group-delay characteristics for combinations of from one to six tuned circuits.

13082 The Heating of Fluorescent Screens Bombarded by Electrons. G. D. Archard and P. A. Einstein. *British Journal of Applied Physics*, v. 8, June 1957, p. 232-236.

The temperature rises of fluoroescent screens under various forms of electron bombardment (such as pulsed or scanned beams) are calculated in terms of screen dimensions and the thermal constants of the phosphor.

13083 What Use Is Delta Modulation to the Transmission Engineer? F. K. Bowers. *Communication and Electronics*, no. 30, May 1957, p. 142-147.

The simplest and cheapest known method of converting a continuous signal into code form, and is preferred whenever coding one channel at a time is desired.

13084* (French.) Fluctuations in Electronic Photomultipliers. **Sur les fluctuations dans les photomultiplicateurs électroniques.** Paul Moatti. *Comptes Rendus*, v. 244, May 6, 1957, p. 2366-2368.

Problems of these fluctuations when the electron capture is incomplete at the different levels. Calculation of various numerical values relative to the secondary emisison, starting with the results obtained from the fluctuations of a photomultiplier.

13085 The Design and Specification of Electronic Sound Systems. Harold Burris-Meyer and Lewis S. Goodfriend. *Consulting Engineer* v. 9, July 1957, p. 70-75.

13086 Earth Satellite Instrumentation. Whitney Matthews. *Electrical Engineering*, v. 76, July 1957, p. 562-567.

Design requirements of a unique telemetering encoder system are examined in the light of the limitations imposed by the over-all satellite program.

13087 Ferrites at Microwaves. P. E. V. Allin. *Electronic Engineering*, v. 29, June 1957, p. 292-296.

Principles of some of the non-reciprocal microwave ferrite devices now available to systems engineers. Applications and performance.

13088 Insulate With Vacuum. H. C. Ross. *Electronic Industries & Tele-Tech*, v. 16, June 1957, p. 103 + 6 pages.

Design of a vacuum relay to interrupt 600 amp. at 15 kv. with a contact separation of only 5/32 in. by careful consideration of molecular mean free paths, solid vapor pressures diffusion of gas through solids, and adsorption of gas by solid surfaces.

13089 Calculating R-C Amplifier Supply Voltages. II. Sid Deutsch. *Electronic Industries & Tele-Tech*, v. 16, June 1957, p. 118 + 2 pages.

The trial and error method is eliminated by assuming that the tube "constants" are actually constants and that the input signal always swings the tube from cutoff to zero grid-to-cathode voltage.

13090 1957 Electronic Industries Directory. *Electronic Industries & Tele-Tech*, v. 16, June 1957, p. 205 + 227 pages.

Directory contains alphabetical listings of products, brand and trade names, engineering societies, consulting engineers, electronic representatives, and manufacturers.

13091* Grid-Circuit Distortion. E. Watkinson. *Electronic and Radio Engineer*, v. 34, June 1957, p. 207-214.

Grid characteristics of multi-electrode valves; graphical representation of distortion; grid-current equation; distortion analysis; variation of current with applied signal; relationship between bias and grid current; reverse grid currents.

13092 Photocell Measures Light Direction. J. T. Wallmark. *Electronics*, v. 30, July 1, 1957, p. 165-167.

Output from semiconductor photocell varies in relation to angle of light source from photocell axis. Varying bias on base contacts gives scanning action similar to that obtained by turning photocell mechanically.

13093 Bridge Sorts Capacitors to Tolerance. Sam D. Breskend, J. I. Cooperman, and P. J. Franklin. *Electronics*, v. 30, July 1, 1957, p. 177-179.

Automatic two-channel system uses Schering bridge to measure dissipation factor and capacitance variation from standard value. Thyratron controlled relays route tested capacitors to over, under, and acceptable bins in 5, 10, and 20% ranges.

13094 Engineering Electronics, With Industrial Applications and Control. John D. Ryder. 666 p. 1957. McGraw-Hill, New York. (TK7815 R97en)

Provides a broad, fundamental coverage of the non-radio areas of electronics, particularly those areas of interest in instrumentation, computation, and general industrial usage.

13095 Loudspeaker Design and Application. Arthur McLean. *Institute of Radio Engineers, Transactions on Audio*, v. AU-5, Mar.-Apr. 1957, p. 30-40. (TK1 In6.6au Vis.)

Problems involved in the design of loudspeakers and in the assessment of their performance.

13096 The Measurement of CRT Beam Apertures. Edward J. Quinlan. *Institute of Radio Engineers, Transactions on Broadcast and Television Receivers*, v. BTR-3, June 1957, p. 14-17. (TK1 In6.6b Vis.)

Aperture meter is designed to determine the aperture effects by measuring the detail contrast of a sinusoidal grid signal as it is reproduced by the cathode-ray tube assembly.

13097 Transistor Feedback Preamplifiers. R. Page Burr. *Institute of Radio Engineers, Transactions on Broadcast and Television Receivers*, v. BTR-3, June 1957, p. 35-39. (TK1 In6.6b Vis.)

Design; H.F. behavior.

13098 A 50 Watt Amplifier for Microwave Relays. L. W. Mallach. *Institute of Radio Engineers, Transactions on Broadcast Transmission Systems*, v. PGBTS-8, June 1957, p. 10-13. (TK1 In6.6bt Contin.)

Description of Kleptron amplifier system for 6000 Mc. television relay.

13099 Temperature Characteristics of the Transfluxor. H. W. Abbott and J. J. Suran. *Institute of Radio Engineers, Transactions on Electron Devices*, v. ED-4, Apr. 1957, p. 113-119. (TK1 In6.6ed Vis.)

Circuit properties of the device, a high-remenance multiholed ferrite core which may be used as a combined memory-a.c. gate, were studied between −60 and + 140 C.

13100 Measurement of High-Frequency Equivalent Circuit Parameters of Junction and Surface Barrier Transistors. A. R. Molozzi, D. F. Page, and A. R. Boothroyd. *Institute of Radio Engineers, Transactions on Electron Devices*, v. ED-4, Apr. 1957, p. 120-125. (TK1 In6.6ed Vis.)

13101 Dependence of Magnetron Operation on the Radial Centering of the Cathode. Gordon E. Becker. *Institute of Radio Engineers, Transactions on Electron Devices*, v. ED-4, Apr. 1957, p. 126-131. (TK1 In6.6ed Vis.)

Operation was best when the cathode was on center. As it was displaced laterally in any direction the efficiency decreased, frequency pushing increased, the spectrum deteriorated, and back-heating increased, while the pulling figure, the Q's, and circuit efficiency remained unchanged.

13102 Some Characteristics of a Cylindrical Electron Stream in Immersed Flow. George R. Brewer. *Institute of Radio Engineers, Transactions on Electron Devices*, v. ED-4, Apr. 1957, p. 134-140. (TK1 In6.6ed Vis.)

Magnitude and wavelength of the beam radius perturbations and the angular velocity of precession of the electrons are determined as functions of the magnetic field, space-charge density, and initial injection slope.

13103 Design and Performance of a High Power Pulsed Magnetron. E. C. Okress, C. H. Gleason, R. A. White, and W. R. Hayter. *Institute of Radio Engineers, Transactions on Electron Devices*, v. ED-4, Apr. 1957, p. 161-171. (TK1 In6.6ed Vis.)

13104 Reliability Indices for Missile Electronic Component Parts. Thomas S. Bills. *Institute of Radio Engineers, Transactions on Reliability and Quality Control*, PGRQC-10, June 1957, p. 1-8. (TK1 In6.6q Contin.)

Practical techniques for deriving component part reliabilities from an actual missile program. Use of these data for estimating the reliability of new equipment.

13105 Topology of Switching Elements vs. Reliability. James P. Lipp. *Institute of Radio Engineers, Transactions on Reliability and Quality Control*, PGRQC-10, June 1957, p. 21-23. (TK1 In6.6q Contin.)

The technique outlined makes feasible the prediction and design of the probable electrical performance of a complicated network wherein each element has an independent and known figure of merit.

13106 Factors in the Reliability of Germanium Power Transistors. Andrew B. Jacobsen. *Institute of Radio Engineers, Transactions on Reliability and Quality Control*, PGRQC-10, June 1957, p. 43-48. (TK1 In6.6q Contin.)

The Motorola 2N176 Ge power transistor is a reliable component. Reliability is influenced by design materials, construction, specifications, testing, and application.

13107 Success Story—Transistor Reliability—1956. C. H. Zierdt, Jr. *Institute of Radio Engineers, Transactions on Reliability and Quality Control*, PGRQC-10, June 1957, p. 57-68.

Characteristics and performance of recently developed transistors.

13108 Proceedings of the 1957 National Symposium on Telemetering. *Institute of Radio Engineers, Transactions on Telemetry and Remote Control*, v. TRC-3, Apr. 1957, sections individually paged. (TK1 In6.6r Contin.)

A collection of 44 papers dealing with various kinds of telemetry systems, data processing, remote control systems, transistor applications, components, and theoretical considerations.

13109 A Note on the Frequency Distribution of an FM/FM Signal. Paul B. Arnstein. *Institute of Radio Engineers, Transactions on Telemetry and Remote Control*, v. TRC-3, May 1957, p. 13-16. (TK1 In6.6r Contin.)

An approximate expression is derived giving the amplitude and phase of the individual frequency components of a signal when the input is a sinusoid.

13110 Transistorized Time Multiplexer for Telemetering. J. M. Sacks and E. R. Hill. *Institute of Radio Engineers, Transactions on Telemetry and Remote Control*, v. TRC-3, May 1957, p. 26-30. (TK1 In6.65 Contin.)

Unit will operate satisfactorily with channel accuracy maintained at ± 0.5% and the commutating frequency changing less than 1% in the temperature range 25 to 70 C.

13111* Transistor Voltage Regulators for Alternators. E. E. Ward and N. H. Sabah. *Institution of Electrical Engineers, Proceedings*, v. 104, pt. A, June 1957, p. 194-203.

Deals with regulators in which a junction transistor regulates the field current of a self-excited exciter.

13112 Nonlaminar Flow in Cylindrical Electron Beams. Kenneth J. Harker. *Journal of Applied Physics*, v. 28, June 1957, p. 645-650.

13113 Glow-Arc Transition in Current-Stabilized Electrical Discharges. Jobe Jenkins and T. Benjamin Jones. *Journal of Applied Physics*, v. 28, June 1957, p. 663-668.

Glow-arc transitions can occur over a wide range of currents when the current source is sufficiently stable; an oxide layer on the cathode is responsible for the transitions to arc at low currents.

13114 Scattering by an Inhomogeneous Solid. II. The Correlation Function and Its Application. P. Debye, H. R. Anderson, Jr., and H. Brumberger. *Journal of Applied Physics*, v. 28, June 1957, p. 679-683.

Scattering can be characterized by an exponential correlation function in the case of a distribution of holes of random shape and size in solid. Specific surfaces of a number of compositions are calculated from their experimental correlation functions and compared to surfaces based on absorption measurements.

13115 Relation of Radio Measurements to the Spectrum of Tropospheric Dielectric Fluctuations. Albert D. Wheelon. *Journal of Applied Physics*, v. 28, June 1957, p. 684-693.

The size spectrum of isotropic fluctuations in the troposphere's dielectric constant is related to quantities measured by radio means. Two classes of experiments are analyzed; line-of-sight phase and amplitude instability and refractometer measurements of dielectric fluctuations.

13116 Microwave Measurements of the Properties of a dc Hydrogen Discharge. Burton J. Udelson, John E. Creedon, and Judson C. French. *Journal of Applied Physics*, v. 28, June 1957, p. 717-723.

Measurements in the positive column indicated that electron density increases with increasing tube current and also with increasing gas pressure in the pressure range measured (2 to 8 mm. Hg). Electron collision frequency is approximately equal to 4.6×10^9 multiplied by the gas pressure in mm. Hg, and is independent of tube current.

13117* The Radio Interference Produced by Corona Discharge. M. I. Large. *Journal of Atmospheric and Terrestrial Physics*, v. 10, nos. 5-6, 1957, p. 245-250.

The radio interference produced by corona discharge from a single point is investigated experimentally and theoretically.

13118* The Fading of Radio Waves Reflected From the *E* Layer. B. Landmark. *Journal of Atmospheric and Terrestrial Physics*, v. 10, nos. 5-6, 1957, p. 288-295 + 2 plates.

Studies of the amplitude and phase of waves of 2 Mc/s frequency reffected vertically from the *E* layer.

13119 (English.) **An Investigation of a High-Current Gas Discharge in a Longitudinal Magnetic Field.** A. L. Bezbatchenko, I. N. Golovin, D. P. Ivanov, V. D. Kirillov, and N. A. Yavlinsky. *Journal of Nuclear Energy*, v. 5, no. 1, 1957, p. 71-85 + 2 plates. (From *Atomnaia Energiia*, v. 1, no. 5, 1956, p. 26.)

A gas discharge in deuterium was investigated at currents of up to 700 kA in a longitudinal magnetic field of up to 12,000 oersted

13120* (French.) On the Internal Resistances and Capacity of Selenium Photo-Cells at Low Temperatures. **Résistances et capacité internes d'une photopile au sélénium aux basses temperatures.** G. Blet. *Journal de Physique et le Randium*, v. 18, May 1957, p. 297-303.

Direct and inverse conductances were investigated as functions of the applied potential difference (between 0.001 and 5 volts) and of the temperature (between 66 and 300 K).

13121* Fabrication of Multicavity Magnetrons. Amarjit Singh and Nagesh C. Vaidya. *Journal of Scientific & Industrial Research*, v. 16, sec. A, Apr. 1957, p. 169-175.

Magnetron tubes of the type 2J32 were fabricated and tested at pulse voltages up to 9 kv. At this pulse voltage a magnetic field of only 1100 gauss can be used.

13122 Summary of Fast Neutron Irradiation Studies on Germanium. W. A. Smith, Jr., J. E. Noonan, and K. Minassian. *Knolls Atomic Power Laboratory (U. S. Atomic Energy Commission)*, KAPL-1742, Apr. 1957, 35 p. (UF767 Un3.1ka Contin.)

Effect of neutron radiation on electrical properties. A non-linear relationship between neutron energy and the number of interstitial atoms produced per neutron is indicated for the energy range 0.7 to 4.8 m.e.v.

13123 Nuclear Radiation—New Challenge for Transistor Makers. Henry P. Steier. *Missiles and Rockets*, v. 2, June 1957, p. 121 + 2 pages.

Reviews work being done on effects of nuclear radiation on transistors.

13124* (German.) Conversion of *p*-Si Into *n*-Si After Exposure to α-Rays. **Über eine Unwandlung von p-Si in n-Si durch α-Strahlen.** F. Trey and F. Oberhauser. *Naturwissenschaften*, v. 44, no. 8, 1957, p. 256-257.

Effects of α-rays on properties of Si.

13125* A Transistorized Radiation Monitor. D. C. Brown and B. P. Faraday. *Nuclear Instruments*, v. 1, May 1957, p. 133-137 + 2 plates.

A completely transistorized device was developed using a p-n-p transistor as the detector head.

13126 A Low-Noise Klystron With High Power Output. R. A. La Plante and G. A. Espersen. *Philips Technical Review*, v. 18, no. 12, 1956/57, p. 361-368.

13127 Photoconductivity Conference. R. G. Breckenridge, B. R. Russell, and E. E. Hahn, editors. 653 p. 1956. John Wiley & Sons, New York. (QC611 P56)

The 30 papers include basic theory, phenomenological theory, interpretation of photoconduction phenomena, and recent data on the properties of important photoconducting materials.

13128 Determination of the Coefficient of Diffusion and Frequency of Ionization in Microwave Discharges. M. P. Madan, E. I. Gordon, S. J. Buchsbaum, and Sanborn C. Brown. *Physical Review*, v. 106, ser. 2, June 1, 1957, p. 839-843.

Method is based on determining the rate of growth of the electron density in a microwave cavity in which an electric field larger than that necessary for breakdown is applied.

13129 Plasma Losses by Fast Electrons in Thin Films. R. H. Ritchie. *Physical Review*, v. 106, ser. 2, June 1, 1957, p. 874-881.

13130 Determination of Optical Constants and Carrier Effective Mass of Semiconductors. W. G. Spitzer and H. Y. Fan. *Physical Review*, v. 106, ser. 2, June 1, 1957, p. 882-890.

By using reflectivity and absorption measurements in the region 5 to 35 μ, the effect of free carriers on the optical constants was determined for *n*- and *p*-type Ge, Si, and InSb, and for *n*-type InAs.

13131 Experimental Determination of Injected Carrier Recombination Rates at Dislocations in Semiconductors. J. P. McKelvey. *Physical Review*, v. 106, ser. 2, June 1, 1957, p. 910-917.

Recombination probabilities associated with lineage boundaries in Ge were determined by measuring the ratio of injected carrier concentrations on either side of such a boundary. The measured cross sections correspond to cylindrical recombination areas of diameter 1.15 A for holes in *n*-type Ge and 2.8 A for electrons in *p*-type Ge.

13132 Resonance Potentials in Thin Films of Potassium Chloride. Harold Jacobs, Irving N. Greenberg, Lister Goble, and Alexander Ramsa. *Physical Review*, v. 106, ser. 2, June 1, 1957, p. 921-926.

Films were bombarded with slow electrons and electron absorption and backscattering studied as a function of bombarding energy.

13133* (English.) **The Surface Potential of Selenium and Its Relation to the Rectification and the Photovoltaic Effects.** Umejiro Yoshida and Akira Suzuki. *Physical Society of Japan, Journal*, v. 12, May 1957, p. 459-463.

Surface potential is influenced by ambient conditions. Characteristics of a rectifier obtained by making metal electrode contact with the Se surface depend on surface potential. Variation of the surface potential under illumination is of the same magnitude as the photoelectromotive force of the Se cell.

13134* Some Contributions to the Theory of Electrical Conductivity, Thermal Conductivity and Thermoelectric Power in Semiconductors. J. E. Parrott. *Physical Society, Proceedings*, v. 70, no. 450B, June 1, 1957, p. 590-607.

The theory of transport phenomena in semiconductors is extended to include the effects of "phonon drag" on electrons and "electron drag" on phonons.

13135 Tight-Bonding Calculation of Acceptor Energies in Germanium and Silicon. R. G. Shulman. *Physics and Chemistry of Solids*, v. 2, Apr. 1957, p. 115-118.

Energies of two electron bonds are calculated using Morse curves to approximate interatomic potentials.

13136 Design Considerations in the First Stage of Transistor Receivers. Larry A. Freedman. *RCA Review*, v. 18, June 1957, p. 145-162.

A discussion of noise performance of transistor R.F. stages utilizing capacitive antennas and of transistor mixer stages utilizing loop antennas. Examples of the noise performance to be expected with each type of antenna.

13137 Optimizing the Dynamic Parameters of a Track-While-Scan System. Jack Sklansky. *RCA Review*, v. 18, June 1957, p. 163-185.

A radar track-while-scan system is analyzed and a scheme for optimizing dynamic parameters suggested.

13138 Concentric - Shear - Mode 455-Kilocycle Electromechanical Filter. R. W. George. *RCA Review*, v. 18, June 1957, p. 186-194.

Experimental filter of simplified design consists of four magnetostrictive ferrite disk resonators operating in the concentric shear mode.

13139 Alloying Properties of Germanium Free of Edge Dislocations. C. W. Mueller. *RCA Review*, v. 18, June 1957, p. 205-212.

Experiments show the effect of surface tension and Ge crystallographic plane on In alloy dot diameter. A satisfactory alloying method consists of wetting an In dot on Ge at 300 C in H, then heating rapidly in N to 550 C.

13140 On the Nonlinear Behavior of Electron-Beam Devices. F. Paschke. *RCA Review*, v. 18, June 1957, p. 221-242.

The nonlinear space-charge-wave equation is derived. By third-order successive approximation this complicated equation is split into three simultaneous linear differential equations, which are solved for the case of a velocity-modulated electron beam (klystron).

13141 A Survey of Methods Used to Determine Contact Potentials in Receiving Tubes. Edward R. Schrader. *RCA Review*, v. 18, June 1957, p. 243-254.

The nature of contact potential and the effects of changes in grid-cathode contact potential on "bias shift" in receiving tubes. Relationships among three methods and the application for which each is best suited.

13142 Influence of Surface Oxidation on Alpha$_{cb}$ of Germanium P-N-P Transistors. J. Torkel Wallmark. *RCA Review*, v. 18, June 1957, p. 255-271.

Oxidation of the Ge surface is a major factor influencing surface recombination and thereby the current transfer ratio, α_{cb}, of Ge p-n-p transistors.

13143 Pulse-Firing Time and Recovery Time of the 2D21 Thyratron. John A. Olmstead and Melvin Roth. *RCA Review*, v. 18, June 1957, p. 272-284.

13144 Microwave Triode Oscillators. C. L. Andrews. *Review of Scientific Instruments*, v. 28, June 1957, p. 443-447.

Coaxial and rectangular wave-guide oscillators yield frequencies of 4 to 6 k.mc. per sec. A metal cap fitted around the anode end of the tube confines the anode grid cavity entirely inside the tube.

13145* (French and English.) **Some Technological Aspects of U.H.F. Triode Design.** E. G. Dorgelo. *Vide*, v. 12, Jan.-Feb. 1957, p. 3-8.

Influence of cathode-current density; cathodes for high current densities; grids with high specific dissipation.

13146* (French and English.) **Some Problems on Disc-Sealed Planar Triodes.** H. Nishio, T. Nemoto, and H. Murakami. *Vide*, v. 12, Jan.-Feb. 1957, p. 9-22.

In tubes like disc-sealed triodes whose interelectrode spacings are small and whose operating cathode temperature is higher than that of conventional receiving tubes, a peculiar phenomenon originated by the evaporation of the cathode material exists. This contributes to decreased electron emission and shortened tube life.

13147* (French and English.) **A 4000 Mc/s Triode With L-Cathode-Construction and Circuit.** K. Rodenhuis. *Vide*, v. 12, Jan.-Feb. 1957, p. 23-31.

Construction details; performance characteristics.

13148* (French and English.) **The Space Charge Distribution in a Static Magnetron.** J. Verweel. *Vide*, v. 12, Jan.-Feb. 1957, p. 32-42.

13149* (French and English.) **A New Electron Lens System Providing Convergent-Divergent Action.** T. Seki, Y. Nikaido, and K. Simada. *Vide*, v. 12, Jan.-Feb. 1957, p. 64-73.

Description and operation of lens system for use in electron-beam type amplifiers.

13150* (French and English.) **The Design of an Electron Gun for a Strip Beam Device.** A. B. Cutting and I. Fraser. *Vide*, v. 12, Jan.-Feb. 1957, p. 74-82.

13151* (French and English.) **Electron Deflection System of Traveling-Wave Cathode-Ray-Tube.** H. Maeda and K. Miyaji. *Vide*, v. 12, Jan.-Feb. 1957, p. 128-140.

Operational characteristics were obtained experimentally by inversion spectrography.

13152* Visualizing Transistor Principles. Oscar E. Pierson. *Western Union Technical Review*, v. 11, July 1957, p. 100-110.

A simplified form of transistor theory.

13153* "88-50" Pre-Amplifier. W. Ian Heath and D. M. Leaky. *Wireless World*, v. 63, July 1957, p. 314-320.

Operates directly from a gramophone pickup, a high-impedance magnetic tape replay head, a high-impedance microphone, or a radio tuner.

13154* (German.) Thermoelectric Force of Non-Polar Semiconductors. **Die Thermokraft von nich tpolaren Halbleitern.** J. Appel. *Zeitschrift für Naturforschung*, v. 12a, May 1957, p. 410-424.

Mechanism of the induction of electrons by heat waves.

13155* (German.) Effect of Different Gases and Moisture on Semiconductor Properties of Deposited Selenium Lead Selenide Layers. **Über die Wirkung verschiedener Gase und Dämpfe auf die Halbleitereigenschaften aufgedampfter Bleiselenidschichten.** H. Gobrecht, F. Niemeck, and K.-E. Boeters. *Zeitschrift für Physik*, v. 148, no. 3, 1957, p. 281-297.

Effect of Hg vapor on dark current and photoconductivity in PbSe coatings. Relation between photoconductive properties and the pressure of different gases.

13156* (German.) Thermodynamic Treatment of Electron Processes in the External Zone of a Semiconductor. **Thermodynamische Behandlung von Elektronenprozessen in Halbleiter - Randschichten.** Helmut A. Müser. *Zeitschrift für Physik*, v. 148, no. 3, 1957, p. 380-390.

Conversion of radiant energy into electrical current in photoelements and rectifiers.

See also: **12663** (Ni in electronic devices); **13042** (electronic circuits and electromagnetic waves); **13244** (atmospheric waveforms); **13246** (causes of atmospheric radio noise); **13263** (color television film); **13318** (high speed oscillograph); **13669** (photoconductivity of CdS).

ENGINEERING ECONOMICS

13157 Small Business: Problems and Prospects. *American Management Association, General Management Series No.* 184, 1957, 42 p. (HD28 Am35g Vis.)

Long-range planning in a small company; financial considerations; competitive advantages of small business; outlook for the future.

13158 The Marketing Concept: Its Meaning to Management; With a Paper on the Role of the College in Executive Development. *American Management Association, Marketing Series No.* 99, 1957, 59 p. (HD28 Am35ma Vis.)

The marketing philosophy as a way of business life, the vice president for marketing; organizing a coordinated marketing staff group.

13159 Increasing Profits on the Marketing Dollar by Controlling Marketing Costs and Raising Sales Force Productivity. *American Management Association, Marketing Series No.* 100, 1957, 59 p. (HD28 Am35ma Vis.)

13160 The Integrated Approach to Product Planning, With a Paper on Consumer Buying Habits. *American Management Association, Marketing Series No.* 101, 1957, 68 p. (HD28 Am35ma Vis.)

13161 Titanium—A New Market for Coal. *Bituminous Coal Research,* v. 17, Summer 1957, p. 10-12.

Present methods of producing Ti require more energy per pound to produce than any other tonnage metal. The demand for both fuel and power should greatly increase consumption of bituminous coal.

13162* (German.) Is There a Future for Calcium? **Hat Calcium eine Zukunft?** Wilhelm von Haken. *Chemische Industrie,* v. 9, May 1957, p. 213-215.

Trends in production, price, and uses in various countries.

13163 Company Organization for Economic Forecasting. Keeping Informed on the Business Outlook. Elizabeth Marting, editor. 86 p. 1957. American Management Assn., New York. (HD28 Am35r Vis.)

How the chief executives of typical businesses keep informed on economic trends. Case histories showing how economic data may be used in practical business planning.

13164 Copper, Nickel, Lead, and Zinc Deposits in Ontario. Jas. E. Thomson, S. A. Ferguson, W. G. Q. Johnston, E. G. Pye, W. S. Savage, and Robert Thomson. 126 p. 1957. Baptist Johnston, Toronto. (QE191 On8.5mr Over.)

Details of properties with producing or potentially producing ore deposits.

13165* Statistical Bulletin Year 1956. *Edison Electric Institute, Bulletin,* May 1957, 73 p.

Generating capacity; generation; energy sales; customers; revenues; operating data and ratios; financial data; farm data; economic statistics.

13166* Capital Costs of Private vs. Public Power for AEC—A Review. Joseph Lerner. *Land Economics,* v. 33, May 1957, p. 113-126.

Analysis of cost considerations involved in choosing between obtaining electricity from a plant to be constructed by the federal government or from a private plant on a long-term contract in which the power rate is to cover certain designated costs.

13167 Economics of Aluminium in Electrical Engineering. E. G. West. *Metallurgia,* v. 55, June 1957, p. 265-270.

The world production of Al is compared with data for other non-ferrous metals used in electrical engineering. Metal supplies, present economics, and future trends are considered.

13168* Nuclear Energy in Sweden's Power Programme. Bernt Hargö. *Nuclear Engineering,* v. 2, July 1957, p. 271-274.

The over-all energy position in Sweden and the current reactor projects are summarized. A review is given of the Government's estimates of expenditure for 1957.

13169* The Oil and Natural Gas Industry in Pakistan. T. H. H. Skeet. *Petroleum,* v. 20, July 1957, p. 255-259.

Effects of the first five yr. plan.

13170 Plotting a Course for New Profit Horizons. 288 p. 1957. International Management Assn., New York. (HF1456 In8pl)

Three representative overseas organizations are described. Papers cover exploring and developing markets abroad; analyzing foreign markets; analyzing and improving foreign operations; financial and tax dimensions; public relations.

13171* Some New Mathematical Aspects of Fixed Charges. Constantine W. Bary and W. T. Brown. *Power Apparatus and Systems,* no. 30, June 1957, p. 230-249.

A demonstration of some new aspects of fixed charges comprised of three significant and interrelated components: return, depreciation, and taxes which depend directly on such return and on the treatment accorded depreciation in their computations.

13172 Reports on Proved Reserves of Crude Oil, Natural Gas Liquids, and Natural Gas in the United States, and Proved Reserves of Crude Oil and Natural Gas Liquids in Western Canada. 23 p. 1956. American Gas Assn., New York. (TN871.5 R29)

13173 Review of Non-Ferrous Metals in 1956. 22 p. 1957. British Metal Corp., London. (TN758 B77r)

Trends in world production; consumption and prices.

See also: **12486** (fertilizer consumption in U. S.); **12619** (chemical equipment costs).

FLUID MECHANICS

13174 Graphical Estimation of Flow Through Orifices. E. J. Gabbay. *Aircraft Engineering,* v. 29, June 1957, p. 175-177.

Generalized chart for estimating air flow through sharp edged orifices at sub-critical pressure ratios.

13175 A Study of Laminar-Flow Heat Transfer in Tubes. Joseph F. Gross and H. C. Van Ness. *A.I.Ch.E. Journal,* v. 3, June 1957, p. 172-175.

A new procedure for the measurement of local laminar-flow heat transfer coefficients. An equation for the correlation of data for local heat transfer rates to liquids flowing upward in laminar flow in vertical tubes under conditions of constant heat flux at the tube wall.

13176 Dynamics of Liquid Agitation in the Absence of an Air-Liquid Interface. David S. Laity and Robert E. Treybal. *A.I.Ch.E. Journal,* v. 3, June 1957, p. 176-180.

The dynamics of agitating single- and two-phase liquid mixtures in the absence of an air-liquid interface was compared with that of similar systems with an interface.

13177 Simplified Flow Calculations for Tubes and Parallel Plates. R. R. Rothfus, D. H. Archer, I. C. Klimas, and K. G. Sikchi. *A.I.Ch.E. Journal,* v. 3, June 1957, p. 208-212.

Working diagrams were developed from which turbulent friction losses and local velocities for tubes and parallel plates can be calculated without interpolation or trial and error procedures.

13178 Effect of Wall Roughness on Convective Heat Transfer in Commercial Pipes. J. W. Smith and Norman Epstein. *A.I.Ch.E. Journal,* v. 3, June 1957, p. 242-248.

Heat transfer and fluid friction measurements were made for air flow through a smooth Cu pipe and six other commercial pipes, with a ratio of diameter to equivalent sand roughness varying from 640 to 64.

13179 Flow of Steam-Water Mixtures in a Heated Annulus and Through Orifices. John W. Hoopes, Jr. *A.I.Ch.E. Journal,* v. 3, June 1957, p. 268-275.

Values of total pressure drop are presented for the flow of vaporizing water in an internally heated 1-in. I.D. by 1¼-in. O.D. annulus at mass velocities of 270 to 1440 lb./sec./sq. ft., pressures of 9 to 180 lb./sq. in., and up to 0.34 fraction by weight vaporized.

13180 Hydraulics of Wetted-Wall Columns. E. R. Michalik. *A.I.Ch.E. Journal,* v. 3, June 1957, p. 276-279.

Flow profiles are developed for the vertical plate and cylindrical column by use of classical equations, and the mass transport, vertical pressure gradient, and optimal design parameters are calculated.

13181 Fluidization and Sedimentation of Spherical Particles. Thomas J. Hanratty and Abdemannan Bandukwala. *A.I. Ch.E. Journal*, v. 3, June 1957, p. 293-296.

Data supporting an expression describing the relation between the sedimenting velocity or the fluidizing velocity and the fraction voids.

13182* On the Bounds of the Thickness of a Steady Shock Wave. M. Z. v. Krzywoblocki. *Applied Scientific Research*, v. 6, sec. A, nos. 5-6, 1957, p. 337-350.

The use of higher order Burnett terms from the solution of the Boltzmann equation in the von Mises approach does not improve the bonds of the thickness of steady shock.

13183* On Harmonic Functions Satisfying a Mixed Boundary Condition With an Application to the Flow Past a Porous Wall. L. C. Woods. *Applied Scientific Research*, v. 6, sec. A, nos. 5-6, 1957, p. 351-364.

Calculating the incompressible two-dimensional flow of a gas past porous surfaces involves determination of an analytic function satisfying a complicated non-linear relation between its real and imaginary parts on these surfaces.

13184* The Laminar Boundary Layer With Distributed Heat Sources or Sinks. Paul L. Chambré. *Applied Scientific Research*, v. 6, sec. A, nos. 5-6, 1957, p. 393-401.

Structural analysis is reduced to the solution of an infinite system of ordinary linear differential equations.

13185* Analysis of Heat-Driven Oscillations of Gas Flows. II. On the Mechanism of the Rijke-Tube Phenomenon. H. J. Merk. *Applied Scientific Research*, v. 6, sec. A, nos. 5-6, 1957, p. 402-420.

Transfer functions of the hot wire acoustic impedances, and dissipation of acoustic energy in the tube are discussed. A first-order solution of the characteristic equation is obtained on the assumption that the Mach number and dissipation of acoustic energy are small.

13186* (English.) **The Transition Process and Other Phenomena in Viscous Flow.** E. Rune Lindgren. *Arkiv för Fysik*, v. 12, nos. 1-2, 1957, p. 1-169.

Details of several experiments, particularly on flow in cylindrical tubes.

13187 Mass Flowmeter With Retarding Disk Integration. R. G. Ballard and J. R. MacIntyre. *Communication and Electronics*, no. 30, May 1957, p. 127-130.

Demonstrates the practicability of measuring mass rate of flow of gases and providing direct integration.

13188* Flow of Suspensions of Non-Cohesive Spherical Particles in Pipes. H. E. Rose and H. E. Barnacle. *Engineer*, v. 203, June 14, 1957, p. 898-901.

(To be continued.)

13189 The Changes Produced in an Air Stream by Wire Gauze. P. Jonas. *Engineers' Digest*, v. 18, May 1957, p. 191-193. (From *Czechoslovak Journal of Physics*, v. 7, no. 2, 1957, p. 202-212.)

Presents the resistance coefficients of five wire gauzes of varying mesh, and establishes some empirical relationships.

13190 Heat Transfer to Flowing Gas-Solids Mixtures in a Circular Tube. Leonard Farbar and Morgan J. Morley. *Industrial and Engineering Chemistry*, v. 49, July 1957, p. 1143-1150.

Data from an exploratory study of silica-alumina catalyst and air are applicable to industrial heat recovery equipment.

13191 Deposition of Suspended Particles From Turbulent Gas Streams. S. K. Friedlander and H. F. Johnstone. *Industrial and Engineering Chemistry*, v. 49, July 1957, p. 1151-1156.

Rate of particle transfer is always less than or equal to the transfer rate of the common gases which follow approximately the Reynolds analogy.

13192 Flow in Open Channels. C. F. Cusick. *Instrumentation*, v. 10, May-June 1957, p. 22-24.

Weirs and flumes are used with float-actuated instruments for open-channel flow measurements.

13193* (Russian.) Adiabatic Motion of an Ideal Gas With High-Intensity Shock Waves. One-Dimensional Unsteady Motions. **Adiabaticheskie dvizheniia sovershennogo gaza s udarnymi volnami bol'shoi intensivnosti. Odnomernye neustanovivshiesia dvizheniia.** G. G. Chernyi. *Izvestiia Akademiia Nauk SSSR, Otdelenie Tekhnicheskikh Nauk*, no. 3, Mar. 1957, p. 66-81.

A method for approximate calculation of unsteady one-dimensional gas flows with shock waves of high and moderate intensity is described, based on representing the equation of motion as a power series.

13194* (Russian.) Frontal Boundary of a Cavitation Region. **O perednei granitse kavitatsionnoi oblasti.** I. G. Portnov. *Izvestiia Akademii Nauk SSSR, Otdelenie Tekhnicheskikh Nauk*, no. 3, Mar. 1957, p. 99-107.

The stability of a stationary temperature field in a moving medium is analyzed for the case when a surface of phase transition is present. A sufficient criterion of instability is established, and when this condition exists, for example, in the case of separated cavitation, the frontal boundary cannot exist in the form of a surface of phase transition, but represents a free surface.

13195 Remarks on the Equilibrium Turbulent Boundary Layer. Donald Coles. *Journal of the Aeronautical Sciences*, v. 24, July 1957, p. 495-506.

Two hypothetical limiting cases of equilibrium flow are described. At one extreme is the boundary layer in a sink flow, with a completely logarithmic mean-velocity profile outside the sublayer. At the other extreme is a continuously separating boundary layer in a dimensionless pressure gradient approximately twice that for the corresponding laminar flow.

13196 Two-Dimensional, Steady, Cavity Flow About Slender Bodies in Channels of Finite Breadth. Hirsh Cohen and Robert Gilbert. *Journal of Applied Mechanics*, v. 24, June 1957, p. 170-176.

13197 Point Source and Point Vortex in the Hodograph Plane. H. Poritsky and R. A. Powell. *Journal of Applied Mechanics*, v. 24, June 1957, p. 183-190.

Hodograph plane solutions possessing point-source and point-vortex singularities are obtained by means of series expansions in product solutions.

13198 Effect of Adverse Pressure Gradients on Turbulent Boundary Layers in Axisymmetric Conduits. J. M. Robertson and J. W. Holl. *Journal of Applied Mechanics*, v. 24, June 1957, p. 191-196.

13199* On the Unsteady Motion of a Viscous Fluid Past a Semi-Infinite Flat Plate. G. F. Carrier and R. C. DiPrima. *Journal of Mathematics and Physics*, v. 35, Jan. 1957, p. 359-383.

13200* One-Dimensional Shock-Motion of a Gas With $\gamma=3$, Enclosed Between Fixed Walls. G. Kuerti and K. Faymon. *Journal of Mathematics and Physics*, v. 35, Jan. 1957, p. 384-393.

13201 The Rheological Properties of Stable Suspensions of Very Small Spheres at Low Rates of Shear. G. F. Eveson. *Oil & Colour Chemists' Association, Journal*, v. 40, June 1957, p. 456-477.

A rotational viscometer was used to investigate, at rates of shear between 0.05 and 1.10 $sec.^{-1}$, the rheological properties of stable suspensions of nine sized fractions of spheres, eight of these fractions being in the "sub-sieve" range (below 60μ). Shows that non-Newtonian behavior is associated with incomplete dispersion of the particles, and that lattice-work structure of flocculated particles forms within a non-Newtonian suspension when it is allowed to remain undisturbed.

13202* (English.) **Measurements of Pressure Fluctuation in the Wake of a Cylinder.** Yasujiro Kobashi. *Physical Society of Japan, Journal*, v. 12, May 1957, p. 533-543.

Apparatus was constructed using a condenser microphone as a transducer with a ratio-discriminator. Frequency response was calibrated by means of Kármán vortices produced by a circular cylinder. Helmholtz resonance and loss in the pressure duct were compensated electrically by a band-rejection filter and a H.F. booster.

13203 Experimental Study of Heat Transfer to Small Cylinders in a Subsonic, High-Temperature Gas Stream. George E. Glawe and Robert C. Johnson. *U. S. National Advisory Committee for Aeronautics, Technical Note* 3934, May 1957, 21 p. (TL507 Un3t)

A Nusselt-Reynolds number relation for cylindrical thermocouple wires in crossflow was obtained from the experimental determination of time constants. Tests were conducted in exhaust gas over a temperature range of 2000 to 3400 R, a Mach number range of 0.3 to 0.8, and a static-pressure range from ⅝ to 1⅝ atmospheres.

See also: **12611** (flow in extraction columns); **12871** (diffusion in three-component gas mixtures); **13771** (liquid flow γ-ray monitor); **13774** (shock waves in free-particle field); **14003** (transmission of detonation); **14013** (theory of turbulence).

FOOD TECHNOLOGY

13204* Evaluation of Clorpactin WCS-50 as a Bactericidal Wash for Crab and Oyster Meats. Melvin A. Benarde. *Applied Microbiology*, v. 5, May 1957, p. 137-140.

Solution is effective on shucked oyster meats but not on crabmeat.

13205* Cannery Wastes Disposal. A Selected, Annotated Bibliography. F. G. Green. 35 p. 1957. National Research Council, Ottawa. (ZTD897 N21.27c Ref.)

Presents extensive annotations on 102 articles.

13206* Storage Properties of Gamma-Irradiated Potatoes. L. E. Brownell, F. G. Gustafson, J. V. Nehemias, D. R. Isleib, and W. J. Hooker. *Food Technology*, v. 11, June 1957, p. 306-312.

The optimum effect of γ irradiation in increasing the storage life of potatoes was obtained with Russet Burbank variety potatoes irradiated in late spring. The optimum radiation dose appears to be about 10,000 rep followed by storage at 45 F and 85 to 90% relative humidity.

13207* Development of Jelly Formulas for Use With Fully Ripe Fruit and Added Pectin. Gladys L. Gilpin, Jessie C. Lamb, Mildred G. Staley, and Elsie H. Dawson. *Food* Technology, v. 11, June 1957, p. 323-328.

13208* De-Oiling of Peanuts to Yield a Potentially Useful Food Product. R. K. Willich and R. O. Feuge. *Food Technology*, v. 11, June 1957, p. 332-336.

Whole blanched peanuts can be freed of oil by soaking them at ambient temperatures in a suitable solvent, like isopentane or hexane. Advantages are mild flavor and low caloric value.

13209 Effects of Nuclear Explosions on Canned Foods. Carlos A. Greenleaf, James M. Reed, George O. Sampson, E. Rolland McConnell, and John M. Sharf. *Operation Teapot (U. S. Atomic Energy Commission)*, WT-1212, Mar. 1956, 89 p. (UF767 Un3.1wt Contin.)

To test the effect of nuclear explosions upon heat-sterilized foods canned in both tin and glass containers, 60 different commercial products covering the categories of vegetables, fruits, juices, fish and shellfish, meats and poultry, specialties, soups, baby foods, and milk were exposed to a shot having about one and one-half times the 20-kt yield considered as nominal. Exposures covered a wide range of civilian handling conditions in homes, commercial storage, retail outlets, and emergency shelters to determine the suitability for use of canned foods either immediately or after some period of storage.

13210* Methods of Improving Food Preservation in Home Refrigerators. E. S. Stoddard and C. E. Hummel. *Refrigerating Engineering*, v. 65, June 1957, p. 33 + 7 pages.

Considers γ radiation, reduced pressure, and lower temperatures for increased storage life of foods.

13211 Wheat Quality. E. N. Greer. *World Crops*, v. 9, July 1957, p. 273-277.

Deals with utilization of wheat for different purposes and appropriate specifications for each use.

See also: **12575** (vitamin A in food); **12686** (analysis of food dyes); **12837** (lycopene oxidation in tomato pulps); **13768** (radioactivity of foods); **13901** (pasteurization of milk); **13935** (air conditioning in the baking industry).

FUELS AND COMBUSTION

13212 Recent Studies on Flame Stabilization of Premixed Turbulent Gases. S. S. Penner and F. Williams. *Applied Mechanics Reviews*, v. 10, June 1957, p. 229-237.

Fundamental studies relating to the recirculation zone behind bluff bodies and wake spreading; flame stabilization behind bluff bodies, by opposed and transverse fluid jets, and in recessed ducts; mechanism of flame stabilization.

13213 Factors and Limitations Involved in the Use of Industrial Gases for Underfiring Coke Ovens. II. L. G. Tucker, Jr. *Blast Furnace and Steel Plant*, v. 45, June 1957, p. 614-617.

Comparison of effectiveness of natural and various manufactured gases. Effect of gas pressure and other factors.

13214* Sasol: World's Largest Oil-From-Coal Plant. J. C. Hoogendoorn and J. H. Salomon. *British Chemical Engineering*, v. 2, July 1957, p. 368-373.

Description and operation of distilling, cracking, and hydrogenating equipment.

13215 Fuel for Sinter Plants. V. S. Pisarev. *Henry Brutcher Translation No.* 3882, 6 p. (From *Stal'*, v. 16, no. 7, 1956, p. 585-586.) Henry Brutcher, Altadena, Calif.

Comparison of anthracite and anthracite fines, as against coke breeze as fuel for sinter plants.

13216* Some Limiting Oxygen Concentrations for Diffusion Flames in Air Diluted With Nitrogen. R. F. Simmons and H. G. Wolfhard. *Combustion and Flame*, v. 1, June 1957, p. 155-161.

Fuels were burned at the surface of a porous hemispherical burner of stainless steel, and the N concentration required to extinguish the flame determined. The limiting O index is primarily determined by the flame temperature.

13217* Some Factors Influencing Stability Limits of Bunsen Flames. P. F. Kurz. *Combustion and Flame*, v. 1, June 1957, p. 162-178.

The blow-off limit of any given fuel-air mixture is independent of burner diameter when expressed as critical velocity gradient. Helium narrows both lean and rich blow-off limits, but neither He nor N affect flash-back limits. Nitrogen and air widen the lean blow-off limit increasingly as the annular-jet velocity is increased.

13218* Mixing and Combustion in Free and Enclosed Turbulent Jet Diffusion Flames. P. D. Sunavala, C. Hulse, and M. W. Thring. *Combustion and Flame*, v. 1, June 1957, p. 179-193.

13219* On the Positive and Negative Ions in Diffusion Flames. Tosirô Kinbara and Hideo Ikegami. *Combustion and Flame*, v. 1, June 1957, p. 199-211.

The mobilities of ions at various points in a diffusion flame were observed by the sheath method in an attempt to discover in what part of a flame the ions were produced and how they combined with other molecules or radicals.

13220* Influence of Diborane on Blow-Off Limits of Hydrocarbon Flames. P. F. Kurz. *Combustion and Flame*, v. 1, June 1957, p. 212-216.

The ratio of hydrocarbon in these binary mixtures at a given jet velocity, v_1, at blow-off to the hydrocarbon in a hydrocarbon flame at blow-off also at v_1 decreases as v_1 increases. In flames of binary hydrocarbon mixtures the ratio increases as v_1 increases. This unique behavior is believed to result because diborane burns selectively.

13221* Experimental Techniques for the Study of Flat Flames by Infra-Red Spectroscopy. D. J. Cole and G. J. Minkoff. *Combustion and Flame*, v. 1, June 1957, p. 241-249.

13222 The Heats of Combustion of Organic Compounds of Nitrogen. I. Ethyl, *n*-Propyl, and *iso*Propyl Nitrates. D. M. Fairbrother, H. A. Skinner, and F. W. Evans. *Faraday Society, Transactions*, v. 53, June 1957, p. 779-783.

A conventional bomb calorimeter was used.

13223* (German.) Experiences With Modern Gas Cleaning Methods. **Erfahrungen mit neuzeitlichen Gasreinigungsverfahren.** Walter Schairer. *Glückauf*, v. 93, Apr. 27, 1957, p. 499-503.

Describes a method of desulfurization of coke-oven gas, by using ammonium hydroxide as a solvent in connection with a wet catalytic process. Even in small units with low H_2S contents, the production of H_2SO_4 proves to be commercially feasible.

13224 Flame Propagation Rates. Chemical Nature of Attachment Service. Leon Lapidus, J. B. Rosen, and R. H. Wilhelm. *Industrial and Engineering Chemistry*, v. 49, July 1957, p. 1181-1186.

A novel approach to the basic phenomenon of flame propagation presents a self-consistent theoretical model which leads to quantitative values of surface recombination coefficients relative to Pt surfaces.

13225 An Approach to the Use of Oil Gas in an Integrated System. L. P. Ingram. *Institution of Gas Engineers, Copyright Publication No.* 506, 1957, 34 p. (TP700 In7.3c Vis.)

Base-, seasonal-, and peakload problems; planned development of gas works; problems of mixing four gases with widely varying characteristics to produce a normal town gas; costs.

13226* (Russian.) Investigation of Heat Exchange in a Coke Layer. **Issledovanie teploobmena v sloe koksa.** N. M. Karavaev and G. P. Stel'makh. *Izvestiia Akademii Nauk SSSR, Otdelenie Tekhnicheskikh Nauk*, no. 3, Mar. 1957, p. 134-141.

Heat exchange in a coke layer is studied by means of thermal modelling, and a modified Nusselt criterion is used to treat experimental data. A formula is given for evaluating the equivalent diameter of a lump on the basis of the screen-size composition.

13227 The Combustion of Fuel in the Bomb Calorimeter as Indicated by Changes in the Pressure System. I. W. S. Patterson and H. B. A. Parr-Burman. *Journal of Applied Chemistry*, v. 7, May 1957, p. 239-243.

The pressure changes in a bomb calorimeter during the combustion of various fuels were followed by means of a capacitance diaphragm gage and an electronic recording system. The influence of heat release and the effect of the crucible wall upon the pressure system were noted. Typical pressure curves for a range of coals and cokes were obtained.

13228 The Properties of Flames Supported by Chain-Branching Reactions. J. Calvin Giddings and Joseph O. Hirschfelder. *Journal of Physical Chemistry*, v. 61, June 1957, p. 738-743.

Numerical calculations were completed on flames supported by a Semenoff type (chain branching with first order chain breaking step) sequence of reactions. This sequence is peculiar in that, according to the steady-state approximation, there is an explosion point at which both the radical concentration and reaction rate go to infinity.

13229 Fuels for the Atomic Rocket. Alfred J. Zaehringer. *Missiles and Rockets*, v. 2, June 1957, p. 93-94.

Fifteen current projects are listed.

13230 Chemical Aspects of High-Energy Solid Propellants. Alfred J. Zaehringer. *Missiles and Rockets*, v. 2, June 1957, p. 110 + 1 page.

Five different systems are discussed.

13231 Here's How to Cut Costs With an O_2 Analyzer. H. B. Lammers. *Power Engineering*, v. 61, June 1957, p. 98-102.

The various instruments described can be used to check combustion efficiency and thus maintain air-fuel ratios.

13232 (French.) Rapid Compression Machines. **Les machines à compression rapide.** A. Combe, H. Guénoche, and C. Meyer. *Revue de l'Institut Français du Petrole et Annales des Combustibles Liquides*, v. 12, Mar. 1957, p. 338-353.

A bibliography of different types of machines, particularly those used for studying combustion in controlled ignition engines.

13233 Free Radicals as Fuels. Karl Scheller, Henry C. Thacher, Jr., and James A. Bierlein. *Wright Air Development Center Materials Laboratory, WADC Technical Note* 56-538, Feb. 1957, 25 p. (TL507 Un3.18t Contin.)

If substantial concentrations of free radicals such as N, H, and NH could be obtained in bulk, the resulting high-energy fuels would yield substantial gains in engine performance. Problems of producing, using, and storing free radicals in the requisite concentrations appear extremely formidable.

See also: **13239** (constitution of coal); **13321** (preparation of homogeneous gaseous mixtures).

GEOLOGY, GEOPHYSICS, MINERALOGY, AND MINING ENGINEERING

13234 Meteoric Dust Erosion Problem and Its Effect on the Earth Satellite. Stuart A. Hoenig. *Aeronautical Engineering Review*, v. 16, July 1957, p. 37-40.

Indicates that for short-lived vehicles the hazard is negligible.

13235* Methods of Drilling for Gas and Oil. II. *American Gas Journal*, v. 184, July 1957, p. 33-35.

Pressure control; auxiliary equipment; men who run the rigs; problems of drilling.

13236 Chemical Equilibrium in Magmatic Gases. A. J. Ellis. *American Journal of Science*, v. 255, June 1957, p. 416-431.

The systems H_2O-S_2, H_2O-S_2-H_2, H_2O-S_2-O_2, and H_2O-CO_2-S_2-H_2, are examined.

13237 Friction Hoist Design Considerations. G. L. Tiley. *Canadian Mining and Metallurgical Bulletin*, v. 50, June 1957, p. 326-333; *Canadian Institute of Mining and Metallurgy, Transactions*, v. 60, 1957, p. 176-183.

A concise account of the underlying principles of friction hoist design, and an attempt to develop a logical method of approaching the problem.

13238 Geology and Foundation Treatment. St. Lawrence Power Project. W. M. Duncan. *Canadian Mining and Metallurgical Bulletin*, v. 50, June 1957, p. 352-358; *Canadian Institute of Mining and Metallurgy, Transactions*, v. 60, 1957, p. 202-208.

Detailed investigation program started in 1953 was employed to outline those aspects of engineering geology which have influenced the design and construction of the various elements of the project.

13239 Coal Science. Aspects of Coal Constitution. D. W. Van Krevelen and J. Schuyer. 352 p. 1957. Elsevier Publishing Co., New York. (TP325 K88.9c)

The technology, geology petrology, chemistry, and physics of coal. Constitution of the coal matrix. Principal physical and chemical properties.

13240 Engineering and Mining Journal Mining Guidebook and Buying Directory. *Engineering and Mining Journal*, v. 158, Mid-June 1957, 298 p.

A comprehensive collection of data on new methods and equipment relating to prospecting, underground and open pit mining, extracting metals from ores, and power for the mining industry.

13241 Handbook of Meteorological Instruments. I. Instruments for Surface Observations. 458 p. 1956. Her Majesty's Stationery Office, London. (QC876 G79.5h)

Design, installation, operation, and maintenance of instruments for temperature, humidity, atmospheric pressure, wind, precipitation, solar radiation, visibility, cloud, and marine observations and measurements.

13242 Partial Air Oxidation of Chattanooga Uraniferous Black Shale. C. R. Kinney and Donald Schwartz. *Industrial and Engineering Chemistry*, v. 49, July 1957, p. 1125-1130.

Humic acids are formed similar to those obtained from coal and seem to have essentially a quinoid carbon structure.

13243* The Dependence of Point-Discharge Currents on Wind as Examined by a New Experimental Approach. M. I. Large and E. T. Pierce. *Journal of Atmospheric and Terrestrial Physics*, v. 10, nos. 5-6, 1957, p. 251-257.

Experiments are described in which a metal point mounted in the open air is artificially raised to a high potential and the resulting point-discharge current is measured.

13244* Atmospheric Waveforms With Very Low-Frequency Components Below 1 kc/s Known as Slow Tails. F. Hepburn. *Journal of Atmospheric and Terrestrial Physics*, v. 10, nos. 5-6, 1957, p. 266-287.

Extensive observations are described of the form, magnitude, quasi-period, and delay relative to the H.F. component of the slow tails of atmospheric waveforms and the variations with time of day and propagation distance.

13245* Movements of Ionospheric Irregularities Observed Simultaneously by Different Methods. I. L. Jones, B. Landmark, and C. S. G. K. Setty. *Journal of Atmospheric and Terrestrial Physics*, v. 10, nos. 5-6, 1957, p. 296-301 + 1 plate.

It is shown that horizontal movements of large-scale irregularities in the ionosphere can be conveniently investigated by recording "bursts" of the amplitude of a reflected radio wave received at one point from three transmitters separated by about 15 km.

13246* Low-Frequency Radio Emission From Aurorae. G. R. Ellis. *Journal of Atmospheric and Terrestrial Physics*, v. 10, nos. 5-6, 1957, p. 302-306.

This paper discusses the possibility that Cerenkov radio emission by auroral particles approaching the earth may contribute to the level of the continuous component of atmospheric radio noise observed at frequencies of hundreds of kc. per sec.

13247* Analysis of Fading Records From Four Spaced Receivers for Ionospheric Wind Measurements. M. Srirama Rao and B. Ramachandra Rao. *Journal of Atmospheric and Terrestrial Physics*, v. 10, nos. 5-6, 1957, p. 307-317 + 1 plate.

This paper deals with the analysis of fading records from four spaced receivers of pulsed radio waves reflected at vertical incidence from the ionosphere, with a view to finding out the shape of lines of maxima and evolve at a better method of calculating wind data.

13248* A Spectrophotometric Investigation of the Air Afterglow. D. T. Stewart. *Journal of Atmospheric and Terrestrial Physics*, v. 10, nos. 5-6, 1957, p. 318-319.

Measurements of the spectral energy distributions of the yellow-green afterglow produced by a discharge in air, and of a similar continuum produced by mixing nitric oxide and atomic oxygen.

13249* The Red and Near-Infra-Red Auroral Spectrum. A. Omholt. *Journal of Atmospheric and Terrestrial Physics*, v. 10, nos. 5-6, 1957, p. 320-331.

Six auroral spectra covering the wavelength range 5400-8800 A were subjected to thorough intensity measurements.

13250* Diffraction Microscopy and the Ionosphere. G. L. Rogers. *Journal of Atmospheric and Terrestrial Physics*, v. 10, nos. 5-6, 1957, p. 332-337.

The application of diffraction microscopy to Mitra records would result in only slight improvements, probably not justifying the effort.

13251* A Study of the Heat Field of the Atmosphere. Feliks Burdecki. *Journal of Meteorology*, v. 14, June 1957, p. 206-234.

Fundamental aspects of the heat balance of the atmosphere and of the atmospheric heat circulation.

13252 Mechanics of Hydraulic Fracturing. M. King Hubbert and David G. Willis. *Journal of Petroleum Technology*, v. 9; *American Institute of Mining and Metallurgical Engineers, Transactions*, v. 210, June 1957, p. 153-168.

13253 Emulsions for Use as Non-Plugging Perforating Fluids. G. G. Priest and B. E. Morgan. *Journal of Petroleum Technology*, v. 9; *American Institute of Mining and Metallurgical Engineers, Transactions*, v. 210, June 1957, p. 177-182.

Emulsions can be prepared which have low filtration rates, controllable densities (from 7.5 to 12.5 lb./gal.), zero insoluble solids content, negligible corrosivity, and satisfactory thermal stability up to approximately 200 F.

13254 Observations on Extensive Air Showers. I. Apparatus. II. Time Variations in the Energy Region of 10^{17} eV. T. E. Cranshaw and W. Galbraith. *Philosophical Magazine*, v. 2, ser. 8, June 1957, p. 797-810.

13255 An Application of Terrestrial Photogrammetry to Glaciology in Greenland. Harold L. Jury. *Photogrammetric Engineering*, v. 23, June 1957, p. 543-550.

Change in position of a moving glacial ice-cliff surface was determined by comparison of two topographic maps produced by photogrammetric methods.

13256 Physics in Meteorology. A. C. Best. 159 p. 1957. Pitman Publishing Corp., New York. (QC861 B46p)

Meteorological instruments; microphysics of clouds, wind, precipitation, and fog; radiation; atmospheric electricity; meteorological optics and acoustics; radio-meteorology; weather control.

13257* Saturation Distribution in a Linear System During Oil Displacement. P. T. Bail and S. S. Marsden. *Producers Monthly*, v. 21, June 1957, p. 22 + 8 pages.

Oil saturation was determined as a function of time and distance by measuring the electrical resistance of segments of the core. Shape of the stabilized zone and recovery at water break through were calculated using both measured and computed relative permeability data.

13258 Chemical Prospecting. Harold Bloom and Harold F. Walton. *Scientific American*, v. 197, July 1957, p. 41-47.

Analysis of surface soil, water, and plants to detect traces of metal which surround a hidden body of ore.

13259 The Absorption of Radio Waves in Space. A. E. Lilley. *Scientific American*, v. 197, July 1957, p. 48-55.

In 1951 it was found that clouds of H between the stars radiate 21-cm. radio waves. The clouds also absorb these waves, providing a sensitive new tool for the radio astronomer.

13260 Fresh Water is Becoming Favorite Fracturing Fluid. Anthony Gibbon. *World Oil*, v. 145, July 1957, p. 76-77.

Inexpensive and plentiful water cuts fracturing costs and eliminates fire hazards.

13261 New Percussion Tool Promises Increased Penetration. H. T. Brundage. *World Oil*, v. 145, July 1957, p. 122 + 1 page.

New down-hole bit hammer developed especially to drill hard formations, particularly West Texas chert.

13262* (German.) Genetic Types of Chrome Ores and Their Exploration. **Die genetischen Typen der Chromerzlagerstätten und ihre Aufsuchung.** Walther E. Petrascheck, Jr. *Zeitschrift für Erzbergbau und Metallhüttenwesen*, v. 10, June 1957, p. 264-272.

Magnetic chrome ore deposits, their tectonics and types of seams. Prospecting methods.

See also: **12660** (analysis of rocks, minerals, and meteorites); **13118** (ionospheric reflection of radio waves); **13164** (Canadian ore deposits); **13269a** (glacier surveys with a phototheodolite); **13510** (high-strength drill pipe).

GRAPHIC ARTS

13263 Colorimetric Characteristics of Color Television Images Recorded on Black and White Film. William L. Hughes. *Iowa State College Bulletin, Engineering Experiment Station, Bulletin* 180, v. 55, Mar. 13, 1957, 30 p. (T21 I9b Vis.)

13264* (Russian.) The Thixotropic Properties of Certain Printing Inks. **O tiksotropnykh svoistvakh nekotorykh pechatnykh krasok.** A. A. Trapeznikov and T. G. Shalopalkina. *Kolloidnyi Zhurnal*, v. 19, no. 2, 1957, p. 232-243.

The strength and viscous properties of two printing inks were investigated in an apparatus based on the coaxial cylinder principle.

13265 Technical Photography, Documentary. S. A. Anthony and Robert Crook. *Operation Teapot (U. S. Atomic Energy Commission)*, WT-1169, June 1956, 34 p. (UF767 Un3.1wt Contin.)

Use of documentary photography in evaluating physical damage from atomic test operations.

13266 Photogrammetry in Cadastral Surveying. J. E. King. *Photogrammetric Engineering*, v. 23, June 1957, p. 493-505.

Principal steps in procedure and results. The obvious requirement of coordinated control and increased accuracy is met by the use of a first-order camera-plotting instrument combination.

13267 The Effect of Prism on the Location of the Principal Point. Francis E. Washer. *Photogrammetric Engineering*, v. 23, June 1957, p. 520-532.

The presence of prism in a lens-camera combination whether arising from a filter having non-parallel surfaces or from small decentrations of the lens elements is evidenced by a displacement of the principal point of autocollimation from the true principal point and the appearance of asymmetric values of the distortion.

13268 Instrumental Aids in Photo-Interpretation. IV. The Minythoscope: An Instrument for Viewing Any Type of Photography on Gradually Decreasing Size (or Scale) for Many Purposes. Hugh T. O'Neill and William J. Nagel. *Photogrammetric Engineering*, v. 23, June 1957, p. 533-535.

13269 Improvements in the Stereo-Mosaic. Gordon R. Heath. *Photogrammetric Engineering*, v. 23, June 1957, p. 536-542.

Improvements mean that the mosaic may be printed on a single sheet, with its stereo-mate printed beside it, or on the back of the sheet. This permits field use and opens the door to possible substitution of stereo-mosaics for standard topographic maps.

13269a The TAF Phototheodolite and Its Use in Glacier Surveys. J. E. Colcord. *Photogrammetric Engineering*, v. 23, June 1957, p. 552-557.

13270 Strato-Lab Balloon Photography. Eugene P. Griffin. *Photogrammetric Engineering*, v. 23, June 1957, p. 582-587.

An account is presented of the first-known attempt to obtain and utilize mapping-photography taken from an altitude considerably in excess of the operational ceiling of present-day reconnaissance aircraft.

13271 Photograph and Map Transformations. Edwin A. Roth. *Photogrammetric Engineering*, v. 23, June 1957, p. 588-593.

A method and associated formulas for computing and accomplishing transformations of any type.

13272 The Miniature Camera Calibrator—Its Design, Development and Use. Harmon Q. Avera. *Photogrammetric Engineering*, v. 23, June 1957, p. 601-607.

Design of calibrator using an achromatic triplet lens as the collimator objective lens.

13273 Research in the Government Printing Office. M. S. Kantrowitz. 8 p. 1957. Research and Engineering Council of the Graphic Arts Industry, Inc., Philadelphia. (Z232.U6 K13r Over.)

Describes study of inks, tape, and adhesive compositions.

13274 Research Progress Reports Presented to the 7th Annual Meeting of the Research and Engineering Council of the Graphic Arts Industry, Inc. 44 p. 1957. (Z244 R31p Over.)

Presents brief summaries of projects in progress.

13275* A Color Schlieren System for High-Speed Photography. George E. Hays. *Society of Motion Picture and Television Engineers, Journal*, v. 66, June 1957, p. 355-356.

System uses the chromatic aberration of two spherically corrected field lenses to produce a color image.

13276* Some Practical Considerations in the Analysis of High-Speed Motion-Picture Data. William G. Hyzer. *Society of Motion Picture and Television Engineers, Journal*, v. 66, June 1957, p. 357-360.

Fidelity of motion-picture images for both visual and quantitative analysis depends upon several factors including optical resolution, image blur, image contrast, image shape characteristics, and differential movement of the image from frame to frame.

13277* Coated Paper Requirements for High-Speed Letterpress Printing. Alex Glassman. *Tappi*, v. 40, June 1957, p. 460-469.

Evaluation of paper surface requirements; method for measuring the relative tolerance of coated papers to printing impression; "tensile at fold" test method which correlates with important aspects of bindery performance and press folder operation.

See also: **13255** (photogrammetry); **13952** (photomensurational technique for forestry); **14010** (aerial photography in highway engineering); **14011** (airphoto analysis for highway location); **14012** (triangulation by aerial photography); **14016** (photography in map making).

HEAT POWER

13278* Operational Experience With Brown Boveri Exhaust-Gas Turbochargers. H. Herger. *Brown Boveri Review*, v. 44, Apr.-May 1957, p. 174-179.

13279* Pressure Charging Cross- and Loop-Scavenged Two-Stroke Diesel Engines. U. Linsi. *Brown Boveri Review*, v. 44, Apr.-May 1957, p. 180-189.

Present stage of development is described.

13280* Brown Boveri Gas Turbines. H. Pfenninger. *Brown Boveri Review*, v. 44, Apr.-May 1957, p. 200-217.

Reliability of machines in continuous service.

13281 Low Temperature Heat Exchange. William E. Gifford. *Chemical Engineering Progress*, v. 53, June 1957, p. 278-281.

Special features and applications of various heat exchange methods and of several heat-exchanger types and heat regenerators.

13282* Boiler Feed Water Treatment for Advanced Steaming Conditions. J. Leicester. *Corrosion Prevention and Control*, v. 4, June 1957, p. 53-58.

Reviews recent trends in methods of improving operational life of marine boiler plants employing higher operating pressures and steam temperatures.

13283* The Harland and Wolff Pressure Charged Two-Stroke Single-Acting Engine. C. C. Pounder. *Institute of Marine Engineers, Transactions*, v. 69, May 1957, p. 161-211 + 3 plates.

Details of engine components; exhaust turbochanger arrangements; operational considerations; engine rating.

13284 Boiler Test Via a Digital Data System. J. H. Bail, C. E. Jones, and H. T. Hoffman. *Instruments and Automation*, v. 30, June 1957, p. 1096-1101.

Describes analysis in New York and boiler operation in Springdale, Pennsylvania.

13285* Dynamic Analysis of Heat Exchanger Control. Bruce D. Hainsworth, Vincent V. Tivy, and Henry M. Paynter. *ISA Journal*, v. 4, June 1957, p. 230-235.

Computor simulation is used to predict and check behavior of the actual exchanger. Effect of pneumatic transmission and of thermal sockets on loop performance and the influence of load changes on optimum control-mode adjustments.

13286 Preliminary Photoelastic Design Data for Stresses in Rocket Grains. D. D. Ordahl and M. L. Williams. *Jet Propulsion*, v. 27, June 1957, p. 657-662.

Engineering design charts were prepared showing the maximum stresses developed in solid propellants as a function of the number of slots, width of the slot, wall thickness, and shape of the star point in the grains.

13287 Two-Dimensional Inflow Conditions for a Supersonic Compressor With Curved Blades. Philip Levine. *Journal of Applied Mechanics*, v. 24, June 1957, p. 165-169.

An analytical study of the flow field existing upstream of a blade row, where the axial flow is subsonic and the relative flow is supersonic. Results show unique dependence of flow through a blade row upon geometry of the entrance region.

13288 Seven League Boots. Seabrook Hull. *Missiles and Rockets*, v. 2, June 1957, p. 63-65.

Known limits on chemical propulsion systems demand an early answer to "what comes next"?

13289 Ships for Space. Peter A. Castruccio. *Missiles and Rockets*, v. 2, June 1957, p. 72-74.

Rocket propulsion systems.

13290 Ion Propulsion and Why. Ernst Stuhlinger. *Missiles and Rockets*, v. 2, June 1957, p. 82 + 2 pages.

A comparison of space-ship propulsion systems.

13291 Nuclear Powered Rockets and the Problems of Heat Release. Rudolf H. Reichel. *Missiles and Rockets*, v. 2, June 1957, p. 96-97.

13292* (German.) Designs of Gas Turbines. **Gestaltung von Gasturbinen.** Karl Leist. *MTZ; Motortechnische Zeitschrift*, v. 18, June 1957, p. 154-163.

Discussion of widely different designs of gas turbines for various applications.

13293* How to Connect Piping to Steam Turbines. *Power*, v. 101, July 1957, p. 92-95.

New standards indicate conditions that must be met to prevent trouble when hooking up steam piping to mechanical-drive turbines and small turbine-generator units, 2000 to 10,000 kw. rated capacity.

13294* New Problems in Auxiliary System Design—Supercritical-Pressure and Nuclear Plants. A. R. Jones and C. J. Baldwin, Jr. *Power Apparatus and Systems*, no. 30, June 1957, p. 157-166.

Discusses the plant heat cycles from the auxiliary system viewpoint, outlines the auxiliary system requirements, and gives typical solutions used by plants in the design and construction stages.

13295* Gland Seal Systems for Modern Hydrogen-Cooled Turbine Generators. R. A. Baudry and L. P. Curtis. *Power Apparatus and Systems*, no. 30 June 1957, p. 328-338.

See also: **13229** (rocket fuels); **13230** (solid rocket propellants); **13900** (automotive exhaust purification).

INFORMATION—PREPARATION AND DISSEMINATION

13296 Documentation. R. E. Fairbairn. *Chemistry & Industry*, no. 2, May 25, 1957, p. 645-648.

Reviews existing sources of chemical information. Recommends more prompt reporting of information, and use of selected indicative rather than the informative type.

13297 The Presentation of Technical Information. Reginald O. Kapp. 147 p. 1957. Macmillan Co., New York. (P7 K14p)

Shows how to achieve clarity and maintain interest, and still be brief and accurate in reporting scientific work.

13298* (Polish.) The Scientific Technical Documentation for Chemists in Poland. **Zagadnienie dokumentacji naukowo-technicznej dla chemików w Polsce.** I. Jęczalikowa. *Przemysł Chemiczny*, v. 13, Apr. 1957, p. 204-207.

13299 Records and Research in Engineering and Industrial Science. J. Edwin Holmstrom. 491 p. 1956. Chapman & Hall, Ltd., London. (T175 H73r3)

A comprehensive guide to the sources and recording of available information on technological subjects.

13300 Recruiting Library Personnel. Automation in the Library. Report of the 41st Conference of Eastern College Librarians. 51 p. 1956. Association of College and Reference Libraries, Chicago. (Z665 As78r)

A compilation of papers on library administration, including recruitment of personnel and use of automatic equipment.

13301 Studies in Coordinate Indexing. v. VI. The Mechanization of Data Retrieval. Mortimer Taube. 129 p. 1957. Documentation Inc., Washington, D. C. (Z1001 T19s)

Papers cover the prototype mechanical "Alpha-Matrex" machine, storage and retrieval systems, automatic dictionaries for machine translation, the Minicard system, and superimposed coding for data storage.

INSTRUMENTATION

13302 Use of a Parallel Plate Model in Calculation of Pore Size Distribution. W. B. Innes. *Analytical Chemistry*, v. 29, July 1957, p. 1069-1073.

13303* (French.) Nuclear Induction Spectrometry. A New Spectrometric Method Based on Nuclear Physics and Its Application to Chemistry. **Spectrométrie à induction nucléaire Une nouvelle méthode de spectrométrie basée sur la physique nucléaire et son application à la chimie.** L. Wegmann. *Chimie & Industrie*, v. 77, May 1957, p. 1051-1058.

Suggests application of nuclear induction spectrometry as a significant complement of infra-red and Raman spectrometry.

13304 Size Separation of Aerosol Particles by an Electrostatic Discriminator. Vadim G. Drozin. *Columbia University (U. S. Atomic Energy Commission)*, NYO-4752 Mar. 1957, 17 p. (UF767 Un3ny)

13305* Improved Methods of Particle Size Analysis. T. H. Hughes. *Engineer*, v. 203, June 7, 1957, p. 860-864.

New methods of dispersal make possible elutriation of sticky dusts. Elutriation rates of free flowing dusts were improved by modified techniques and apparatus.

13306 Engineering Optics. The Principles of Optical Methods in Engineering Measurements. K. J. Habell and Arthur Cox. 411 p. 1956. Sir Isaac Pitman & Sons, Ltd., London. (QC371 H11e)

Fundamental properties of optical systems; aberration and diffraction; light and illumination; microscopes; telescopes; optical projection; miscellaneous optical methods.

13307* A Photoelectric Telephotometer of High Sensitivity and High Angular Selectivity. Frank F. Crandell and Karl Freund. *Illuminating Engineering*, v. 52, June 1957, p. 319-322.

13308* Magnification Change in Schlieren Systems. George H. Blount and Gene M. Jordan. *ISA Journal*, v. 4, June 1957, p. 216-218.

A simple method, reduced to graphic form, for determining the lenses which will produce a given magnification change, without repositioning the viewing screen, knife edge, or large mirror.

13309* How to Specify Thermocouple Response. Robert J. Moffat. *ISA Journal*, v. 4, June 1957, p. 219-223.

Equation for predicting response rate is accurate to within 10% if certain conditions of conduction, weld-bead size, and junction shape are met.

13310* (Russian.) Ultrathin Sectioning in Electron Microscopy of Catalysts. **Primenenie metoda ul'tratonkikh srezov v electronnoi mikroskopii katalizatorov.** A. M. Rubinshtein, M. I. Dashevskii, and N. A. Pribytkova. *Izvestiia Akademiia Nauk SSSR, Otdelenie Khimicheskikh Nauk*, no. 4, Apr. 1957, p. 431-435.

Construction of a new microtome for cutting ultrathin sections of catalysts and absorbents.

13311 Determination of the Mean Particle Size of Fine Black Powders by the Measurement of Reflectivity. H. E. Rose. *Journal of Applied Chemistry*, v. 7, May 1957, p. 244-250.

Apparatus and techniques.

13312 A Specimen Preparation Technique for the Crystal Habit Analysis of Fibrous Crystals. Eiji Suito, Natsu Uyeda, and Kazuyoshi Takiyama. *Journal of Electronmicroscopy (Annual Edition)*, v. 5, 1957, p. 14-18.

Method is applied to V_2O_5 sol and Cu- and Zn-phthalocyanines.

13313 A Water-Cooled Mercury Arc Lamp for the Excitation of Raman Spectra. L. A. Woodward and D. N. Waters. *Journal of Scientific Instruments*, v. 34, June 1957, p. 222-224.

Describes a modified Toronto-type Hg-vapor lamp.

13314 An Apparatus Giving Thermogravimetric and Differential Thermal Curves Simultaneously From One Sample. D. A. Powell. *Journal of Scientific Instruments*, v. 34, June 1957, p. 225-227.

Modifications to a Chevenard thermobalance enable it to record simultaneously, but on separate charts, both thermogravimetric and differential thermal curves of a single sample undergoing thermal decomposition.

13315 An Automatically Recording Vacuum Balance. M. I. Pope. *Journal of Scientific Instruments*, v. 34, June 1957, p. 229-232.

Apparatus can record changes in weight of a solid, either in the presence of a gas or *in vacuo*, at temperatures of up to 1000 C.

13316 A Solid State Paramagnetic Resonance Spectrometer. P. M. Llewellyn. *Journal of Scientific Instruments*, v. 34, June 1957, p. 236-239.

Describes instrument for use in the frequency range 9000 to 10,000 Mc. per sec. and at the temperature of boiling refrigerants down to about 14 K.

13317 The Design of Calorimeters for the Determination of Ion Beam Intensities. E. R. Harrison. *Journal of Scientific Instruments*, v. 34, June 1957, p. 242-244.

13318* (Russian.) High Speed Oscillograph. **Vysokoskorostnoi ostsillograf.** M. Ia. Balats, P. I. Lebedev, and Iu. V. Obukhov. *Pribory i Tekhnika Eksperimenta*, no. 2, Mar.-Apr. 1957, p. 63-67 + 1 plate.

Description of oscillograph that could be used for investigation of impulses up to 3×10^{-9} sec.

13319* (Russian.) Instrument for Interpretation of Roentgenograms. **Pribor dlia rasshifrovki rentgenogram.** S. L. Nudelman. *Pribory i Tekhnika Eksperimenta*, no. 2, Mar.-Apr. 1957, p. 83-89.

Description and operating procedures.

13320 Radiocarbon Dating With Liquid CO_2 as Diluent in a Scintillation Solution. G. W. Barendsen. *Review of Scientific Instruments*, v. 28, June 1957, p. 430-432.

13321 (French.) Experimental Study of a Method to Entrain a Vapor in a Gas. **Étude expérimentale d'une méthode d'entrainement d'une vapeur par un gaz.** A. Combe, A. Labardin, F. Mauss, C. Meyer, and R. Vaucher. *Revue de l'Institut Français du Petrole et Annales des Combustibles Liquides*, v. 12, Mar. 1957, p. 330-337.

Apparatus for preparation of homogeneous gaseous mixtures of known concentration.

13322 Constant Flow-Rate Device for Electrolyte Eluants in Column Chromatography. R. K. Main, L. J. Cole, L. M. Bryant, and S. K. Morris. U. S. *Naval Radiological Defense Laboratory, Research and Development Technical Report*, USNRDL-TR-131 NM 006-015, Jan. 1957, 12 p. (QC475 Un3.5r Contin.)

Device operates on the principle of volume delivery rather than that of capillary throttle.

13323* (German.) High Vacuum Pumps Based on Root's Principle. **Feinvakuumpumpen nach dem Roots-Prinzip.** Hans-Georg Nöller and Richard Thees. *VDI Zeitschrift*, v. 99, May 1957, p. 613-619.

Description, operation, and applications of Root-type vacuum pumps.

13324* (German.) Application of X-Ray Small Angle Dispersion for Testing Technical Preparations. **Anwendung der Röntgenkleinwinkelstreuung zur Untersuchung technischer Präparate.** Heinrich Knapp. *Zeitschrift für Angewandte Physik*, v. 9, May 1957, p. 233-239.

Description and operation of a small-angle Kratky camera.

13325* (Russian.) The Preparation and Use of Carbon Films in Electron Microscopy. **Prigotovlenie i ispol'zovaniia ugol'nykh plenok v elektronnoi mikroskopii.** A. A. Petrova, V. I. Pochtarev, and E. V. Tsvetkova. *Zhurnal Fizicheskoi Khimii*, v. 31, Feb. 1957, p. 372-376 + 2 plates.

See also: **12475** (mounting of gyroscopes); **12600** (joining glass piping); **12991** (color measurement); **13568** (hardness testing equipment); **13848** (electron microscopy tables); **13930** (electron microscopy of rubber).

LUBRICATION AND FRICTION

13326 Radiochemical Study of Stability of Solutions of Additives in Lubricating Oils. Yu. S. Zaslavskii, R. N. Shneerova, and G. I. Shor. *Henry Brutcher Translation No. 3919*, 4 p. (From *Zavodskaia Laboratoriia*, v. 22, no. 4, 1956, p. 417-418.) Henry Brutcher, Altadena, Calif.

Temperature effects, the action of water, and other properties are determined using β radiation.

13327* Antiwear Requirements for Navy Turbine Oils. H. F. King and J. R. Belt. *Bureau of Ships Journal*, v. 6, July 1957, p. 6-14.

13328* (Russian.) Atomic Capture From Solids in Friction. **Ob atomapnom skhvatyvanii materialov pri trenii.** D. N. Garkunov and I. V. Kragel'skii. *Doklady Akademii Nauk SSSR*, v. 113, no. 2, Mar. 11, 1957, p. 326-327.

Selective diffusion of atoms and particles from an alloy during friction.

13329 High Temperature Steel Mill Greases. John Simon. *Iron and Steel Engineer*, v. 34, June 1957, p. 93-103.

Performance requirements; characteristics; effect of additives.

13330* (English.) **Air-Lubricated Bearings With Capillary Air-Feeder Holes.** Tokio Sasaki and Haruo Mori. *Kyoto University, Memoirs of the Faculty of Engineering*, v. 19, Apr. 1957, p. 14-24.

Bearings can be operated in quite a stable state and with an extremely small coefficient of friction.

13331* Extreme Pressure Lubricants. *Lubrication*, v. 43, June 1957, p. 65-76.

Theories of boundary lubrication. Evaluation tests and applications.

13332 Lubrication of Bearings. F. T. Barwell. 292 p. 1956. Butterworths Scientific Publications, London. ((TJ1075 B28L)

Principles underlying bearing behavior; fundamentals of friction and wear in relation to selection of lubricants and bearing materials; procedure for bearing design.

13333* Yield Stress as a Factor in the Performance of Greases. D. Evans, J. F. Hutton, and J. B. Matthews. *Lubrication Engineering*, v. 13, June 1957, p. 341-346.

Apparatus for measuring cone resistance value as a function of temperature. Use in defining quality of a grease.

13334* Specific Heats of Aircraft Engine Lubricants at Low Temperatures. V. E. Schrock and R. E. Gott. *Lubrication Engineering*, v. 13, June 1957, p. 353-358.

Method used to measure specific heat of lubricating oils over the temperature range of 70 to 100 F; related data on typical gas turbine and piston engine lubricants.

13335 Aluminum-Tin Bearings. High Tin Types Reduce Wear. E. C. Ellwood. *Materials & Methods*, v. 45, June 1957, p. 110-113.

With as-cast brittleness eliminated by heat treatment, Al bearings containing 25 to 50% Sn offer low wear and good fatigue resistance. They are particularly useful for heavy loads on unhardened steel shafts.

13336* (French.) Reducing the Friction Coefficient by Using Molybdenum Disulfide. **La réduction du coefficient de frottement par utilisation du bisulfure de molybdène.** Pierre Bessière. *Metaux, Corrosion-Industries*, v. 32, Apr. 1957, p. 149-161.

A study of the possible industrial applications of MoS_2 as a lubricant. Effects of speeds, pressure, air, vacuum, and surface phosphatizing treatment.

13337* Lubricants for Atomic Power. *Petroleum*, v. 20, July 1957, p. 241-242.

13338 Oil Cooling and Oil Coolers. IV. Aircraft Oil Coolers. G. A. Montgomerie. *Scientific Lubrication*, v. 9, June 1957, p. 14-19.

A general description of air cooled and fuel cooled oil coolers.

13339 Review of Research Study of Thixotropy of Greases. *Scientific Lubrication*, v. 9, June 1957, p. 24-26.

From a study by the U. S. Department of Commerce, Office of Technical Services.

13340 Diesel Engine Lubricants: Their Selection and Utilization With Particular Reference to Oil Alkalinity. A. Dyson, L. J. Richards, and K. R. Williams. *Scientific Lubrication*, v. 9, June 1957, p. 34 + 3 pages.

13341* (German.) Colloidal Graphite and Its Influence on Friction and Lubrication, Especially in Combustion Engines. **Kolloidaler Graphit und sein Einfluss auf Reibung und Schmierung, besonders in Verbrennungsmotoren.** Josef Udo Augustin and Anna Maria D'Ans. *VDI Zeitschrift*, v. 99, May 1957, p. 624-632.

Experiments show that colloidal graphite from lubricating oils precipitates on and in the working surfaces of cylinders in combustion engines. Electrolytic deposition of graphite on the surfaces of sliding parts gives a smooth and very adhesive protective layer.

13342 Heat Capacities of Synthetic Engine Oils and Lubricants. Hyman Marcus. *Wright Air Development Center Materials Laboratory, WADC Technical Report* 57-38, Apr. 1957, 10 p. (TL507 Un3.18w Vis.)

Variation of the heat capacity as a function of temperature was determined for 11 synthetic fluids conforming to military specification MIL-L-7808.

MECHANICAL ENGINEERING

13343* (Russian.) The Stability of a Rectangular Plate Compressed Beyond the Limits of Elasticity. **K voprosu ob ustoichivosti priamougolnoi plastinki pri szhatii za predelom uprugosti.** K. F. Voitsekhovskaia. *Akademiia Nauk Ukrains'koi RSR, Dopovidi*, no. 2, 1957, p. 121-125.

Relationships of stresses and strains in the plate due to the loss of stability in the elastic and plastic region. Equations for a plate subjected to bending; expressions for critical flexibility.

13344* The Centre of Shear for a Material Having a Non-Linear Stress-Strain Curve. W. Johnson and P. B. Mellor. *Applied Scientific Research*, v. 6, sec. A, nos. 5-6, 1957, p. 467-477.

Analysis of the effect on the position of the center of shear when a contilever is loaded so that the flanges and part of the web become plastic.

13345* (Russian.) Calculation of Crack Formation in Prestressed and Ordinary Reinforced Concrete Sections. **K raschetа predvaritel'no napriazhennykh, obychnykh zhelezobetonnykh i betonnykh sechenii po obrazovaniiu treshchin.** A. A. Gvozdev and S. A. Dmitriev. *Beton i Zhelezobeton*, no. 5, May 1957, p. 205-211.

Computation of cracks caused by non-uniform stresses at bends and other critical areas.

13346* Designing a Pneumatic Conveyor. S. J. Michell. *British Chemical Engineering*, v. 2, July 1957, p. 356-358.

Theoretical and practical aspects, followed by a numerical example.

13347 The Measurement of Surface Residual Stress by X-Rays. G. A. Hawkes. *British Journal of Applied Physics*, v. 8, June 1957, p. 229-232.

A multi-exposure, X-ray back-reflection technique, with graphical solution for the evaluation of the level of residual macro-stress in any particular surface direction in polycrystalline material is described. This technique was applied to the stress analysis of Al alloys and high tensile steel components and specimens.

13348* Determining the Critical Speeds of Fast-Running Shafts. C. Bellenot, L. S. Dzung, and E. Erni. *Brown Boveri Review*, v. 44, Apr.-May 1957, p. 234-238.

Studies with modern calculating machines and a mechanical model.

13349 Measuring Small Displacements. Pneumatic Method for Observing Lift in Turbine Shafts. C. A. Scoles. *Engineering*, v. 183, June 21, 1957, p. 786-787.

Describes instrument to measure turbine-shaft displacement in main bearings during severe running conditions.

13350 Dynamic Tooth Forces. G. Nieman and H. Rettig. *Engineers' Digest*, v. 18, May 1957, p. 197-200. (From *VDI Zeitschrift*, v. 99, Jan. 21, 1957, p. 89-96.)

Measures the actual tooth forces and, in particular, their dependence on other variables. (To be concluded.)

13351* (German.) Water Hammer Problems. Laboratory Investigation of Service Equipment. **Druckstossprobleme. Untersuchungen im Laboratorium und an in Betrieb befindlichen Anlagen.** Paul Böss. *Gas- und Wasserfach*, v. 98, Ausgabe Wasser. May 1957, p. 548-552.

Origin of water hammering and its causes. Checking and improving measuring equipment and pipes. Application of polyethylene pipes in systems.

13352 Reflection of Dilatational Waves at the Edge of a Plate. T. R. Kane. *Journal of Applied Mechanics*, v. 24, June 1957, p. 219-227.

In general, a dilatational wave propagated toward the edge at an arbitrary angle of incidence gives rise to three reflected waves; namely, two dilatational waves and a shear wave.

13353 The Propagation of Compressional Waves in a Dispersive Elastic Rod. I. Results From the Theory. Julius Miklowitz. **II. Experimental Results and Comparison With Theory.** Julius Miklowitz and C. R. Nisewanger. *Journal of Applied Mechanics*, v. 24, June 1957, p. 231-244.

13354 General Instability of a Ring-Stiffened, Circular Cylindrical Shell Under Hydrostatic Pressure. S R. Bodner. *Journal of Applied Mechanics*, v. 24, June 1957, p. 269-277.

13355 Collapse Strength of Redundant Beams After Lateral Buckling. E. F. Masur and K. P. Milbradt. *Journal of Applied Mechanics*, v. 24, June 1957, p. 283-288.

Theory traces the effect of nonlinear terms in the strain-displacement relations on the predicted post-buckling behavior of redundant beams.

13356* A Derivation of the Equations of Shell Theory for General Orthogonal Coordinates. James K. Knowles and Eric Reissner. *Journal of Mathematics and Physics*, v. 35, Jan. 1957, p. 351-358.

13357* (English.) **On the Vibrational Damping of Structural Steel Beams.** Yoshikazu Yamada. *Kyoto University, Memoirs of the Faculty of Engineering*, v. 19, Apr. 1957, p. 1-13.

13358 New Methods for Analytically Determining States of Stress. John O. Predale. *Machine Design*, v. 29, June 13, 1957, p. 157-162.

Simplified procedures for analytical determination of states of principal stress and maximum shear stress.

13359 Mechanics of Vehicles. III. Steering Forces and Stability. IV. Stability on a Curve. Jaroslav J. Taborek. *Machine Design*, v. 29, June 27, 1957, p. 92-100; July 11, 1957, p. 147-151.

13360 Nomographs for Calculating Stress in Rotating Cylinders Carrying Liquid Loads. E. V. Garner. *Machine Design*, v. 29, July 11, 1957, p. 159-162.

Stresses resulting from rotation of thin-walled, cylindrical machine components, carrying a liquid load, can be found quickly from these nomographs.

13361 Explosion-Bulge-Test Performance of Low-Carbon Ni-Cr-Mo-B Quenched and Tempered Steel Weldments. P. P. Puzak. *Naval Research Laboratory, Report* 4919, May 1957, 11 p. (T21 Un3.5n Contin.)

13362* Evaluating the Packaging Requirements of a Product. Carl L. Brickman. *Package Engineering*, v. 2, July 1957, p. 19 + 7 pages.

Emphasizes that the protection needs of a product must be determined before a suitable package can be developed.

13363* The Elusive "G" Factor. Halden L. Lewis. *Package Engineering*, v. 2, July 1957, p. 41 + 6 pages.

Forces of shock, bumps, and normal handling are considered in design of packages.

13364 Stress-Concentration Factors. I. Alexander Gomza. *Product Engineering*, v. 28, June 1957, p. 211 + 4 pages.

Graphical data for sharp discontinuities in machine parts such as holes in bars under tension, notched bars, and plates in bending.

13365 Rayleigh's Principle and Its Applications to Engineering. G. Temple and W. G. Bickley. 152 p. 1956. Dover Publications. (QA935 T24r)

Theory and practice of the energy method for the approximate determination of critical loads and speeds.

13366 Second-Order Torsion and Bending of Isotropic Elastic Cylinders. W. S. Blackburn and A. E. Green. *Royal Society, Proceedings*, v. 240, ser. A, June 11, 1957, p. 408-422.

13367* (Russian.) The Strength of Press Fits and Hot Fits Under Impact Torsion. **Prochnost' pressovykh i goriachikh posadok pri udarnom kruchenii.** B. M. Ruzhitskii. *Vestnik Mashinostroeniia*, v. 37, May 1957, p. 10-13.

The strength of press and hot fits was investigated by using test specimens made of carbon structural steel normalized at 800 C. The effect of the wall thickness of the bushing was studied.

13368* Stress in a Plate Containing Infinite Parallel Rows of Holes. Hideo Saito. *Zeitschrift für Angewandte Mathematik und Mechanik*, v. 37, Mar.-Apr. 1957, p. 111-115.

Plate is in a state of generalized plane stress and subjected to uniform tension in a constant direction. Values of stresses at the edge of holes are computed.

See also: **13044** (electric dynamometers); **13237** (friction hoist design); **13293** (steam-turbine piping); **13491** (design of brass castings); **13513** (selection of materials for gears); **13533** (residual stresses in railroad car wheels); **13580** (designing for thermal stress fatigue); **13889** (high speed strain waves); **13978** (stresses in adhesive joints).

METALLURGY

13369 Vibration Treatment of Metals. H. J. Seemann and H. Staats. *Acoustical Society of America, Journal* v. 29, June 1957, p. 698-701.

Treatment of solid and liquid metals by elastic vibrations, with particular attention to the electrodynamic method in which the alternating field of a coreless induction furnace has a strong static magnetic field superimposed on it, so that the molten metal itself becomes the sonic transducer with the production of radially directed vibrations.

13370* Metallurgical Control in Cutting Tool Manufacture. J. G. Ritchie. *Australasian Engineer*, v. 49, Apr. 1957, p. 62-71.

Principal materials used for cutting tools and their properties. Principles involved in the heat treatment of high speed steel. Quality requirements in steels for tool manufacture. Manufacturing operations.

13371* S. G. Iron—A Versatile Engineering Metal. W. W. Braidwood. *Australasian Engineer*, v. 49, May 1957, p. 41-48.

Production techniques, engineering properties, and uses for spheroidal graphite iron.

13372 Development of Dimensionally Stable Uranium Alloys. F. R. Shober, L. L. Marsh, and G. T. Muehlenkamp. *Battelle Memorial Institute (U. S. Atomic Energy Commission)*, BMI-961, Oct. 1954, 37 p. (UF767 U3b Contin.)

Carbon, Ge, and Sn of atomic group IV-B, and Ti and Mo increase the dimensional stability of α-rolled α-annealed U. Boron, Cr, Co, Hf, Pb, Mn, Ni, Nb, Ta, W, V, and Zr additions to U exhibited limited or zero improvement in the dimensional stability.

13373 Hot-Strength, High-Chromium Steels for Service at 550-600°C (1020-1100°F). L. Ya. Liberman and A. V. Boeva. *Henry Brutcher Translation No.* 3811, 12 p. (From *Metallovedenie i Obrabotka Metallov*, v. 2, no. 6, 1956, p. 16-25.) Henry Brutcher, Altadena, Calif.

Previously abstracted from original. See item 14636, v. 5, Nov. 1956.

13374 Studies of the Titanium-Aluminum System. K. Sagel, E. Schulz, and W. Zwicker. *Henry Brutcher Translation No.* 3909, 11 p. (From *Zeitschrift Metallkunde*, v. 47, no. 8, 1956, p. 529-534.) Henry Brutcher, Altadena, Calif.

Previously abstracted from original. See item 16621, v. 5, Dec. 1956.

13375* Cast Metals Handbook. 4th Ed. 316 p. 1957. American Foundrymen's Society, Illinois. (TS230 Am35c4)

Properties, specifications, and other data on gray, white, malleable, and nodular cast irons, steel castings, and non-ferrous alloys.

13376 Chromium. v. II. Metallurgy of Chromium and Its Alloys. Marvin J. Udy. 402 p. 1956. Reinhold Publishing Corp., New York. (QD181.C7 Ud9c)

Nineteen papers on recovery from ores, electrowinning, electrodeposition, metallurgical uses, and chrome refractories.

13377 Chromium in Cobalt-Base Alloys. Howard Cross. Paper from "Chromium. v. II. Metallurgy of Chromium and Its Alloys". 1956. p. 304-309. Reinhold Publishing Corp. (QD181.C7 Ud9c)

Appreciable amounts of Cr in the alloys contribute to the formability, ductility hardness and corrosion resistance at both room and elevated temperatures, oxidation resistance, and strength at elevated temperatures.

13378 Chromium in Titanium-Base Alloys. Murray C. Udy. Paper from "Chromium. v. II. Metallurgy of Chromium and Its Alloys". 1956. p. 319-323. Reinhold Publishing Corp. (QD181.C7 Ud9c)

Describes melting, forging, rolling, cold working, heat treatment, and properties of Cr-Ti alloys. Their outstanding property is high room-temperature strength in combination with low specific gravity.

13379* (German.) Investigations on Alloy Casehardening Steels. **Untersuchungen an legierten Einsatzstählen.** Waldemar Breuer. *Härterei-Technische Mitteilungen*, v. 11, no. 1, 1956, p. 9-24.

Determination of physical and chemical properties of 12 types of open-hearth steels.

13380 New Process Makes Rolled Steel Directly From Pig Iron. *Iron Age*, v. 179, June 27, 1957, p. 97-100.

Process involves melting; granulation; and rolling into sheet.

13381 Physical Metallurgy of Low-Carbon, Low-Alloy Boron Steels. K. J. Irvine, F. B. Pickering, W. C. Heselwood, and M. Atkins. *Iron & Steel*, v. 30, June 8, 1957, p. 272-280.

Effect of alloying elements on isothermal transformation characteristics; effects of tempering treatments; welding characteristics.

13382 Aluminium Cladding of Buildings. E. H. Laithwaite and E. W. Skerrey. *Journal of Applied Chemistry*, v. 7, May 1957, p. 216-231.

A range of purities and alloys of Al is available for the different types of cladding for buildings. In general Al cladding requires no maintenance or protective treatment after erection.

13383 Preparation and Properties of Boron Treated Non-aging Open Hearth Steel. Eric R. Morgan and John C. Shyne. *Journal of Metals*, v. 9; *American Institute of Mining and Metallurgical Engineers Transactions*, v. 209, June 1957, p. 781-785.

13384 Beryllium and Beryllia. *Metal Industry*, v. 90, June 1957, p. 519-521.

Physical properties, fabrication, machining, and joining of Be metal. (To be continued.)

13385* (Russian.) Effect of Oxygen on Quality of Mild Rimmed Steel. **Vliianie kisloroda na kachestvo miagkoi kipiashchei stali.** A. M. Pochtman. *Metallurg*, no. 6, June 1957, p. 15-16.

Effect of O content on aging, forging, and other properties. With lowering of O content the non-metallic inclusions decrease and the metal structure is improved.

13386 Nickel Progress. *Metallurgia*, v. 55, June 1957, p. 295-298.

Canadian developments in prospecting, extraction, and applications.

13387 Metallurgical Aspects of Calder Hall. Tom Bishop. *Metal Progress*, v. 71, June 1957, p. 65-71.

Problems solved include uranium fabrication and canning, selection of steels for pressure vessels, and their erection and stress-relief.

13388 Titanium Alloys. Robert I. Jaffee. *Metal Progress*, v. 71, June 1957, p. 101-103.

Characteristics of presently available alloys for aircraft use at high temperatures are summarized along with future possibilities. Present indications are for an alloy for use at a top temperature of 1000 F. A Ti-base material suitable for service at 1200 F is doubtful.

13389 Steels for Pressure Die Casting Dies. K. I. Bengtsson. *Metal Treatment and Drop Forging*, v. 24, June 1957, p. 227-236.

Deals with thermal stresses in diecasting dies and discusses the effects of alloying elements and how they affect the physical properties of the steel and its resistance to the corrosive action of the alloy being cast. The high-temperature tensile properties of some typical die steels are described, with reference also to their resistance to softening after prolonged tempering at 600 C. Includes notes on heat treatment, important factors tending to increase die life, and future metallurgical trends.

13390* (German.) Present State and Trends in the Metallurgy of Titanium. **Stand und Entwicklungsrichtlinien der Titanmetallurgie.** L. E. Gillemot. *Neue Hütte*, v. 2, Feb.-Mar. 1957, p. 84-91.

Survey of the Ti industry. Reduction of $TiCl_4$ with Na or Mg. Attempts to utilize a wet process in removal of by-products.

13391* (German.) Automation in the Metallurgical Industry. **Die Automatisierung in der Hüttenindustrie.** Reinhold Perlick. *Neue Hütte*, v. 2, Feb.-Mar. 1957, p. 92-102.

Problems and suggested solutions in blast furnace control. Developments in automation of steel mills.

13392* (German.) The Production of High-Speed Steel in the German Democratic Republic. **Die Erzeugung von Schnellarbeitsstahl in der Deutschen Demokratischen Republik.** Karlkeinz Werner. *Neue Hütte*, v. 2, Apr. 1957, p. 214-219.

Melting process, charge, furnace practice, and casting conditions. Soft annealing process. Influence of the degree of deformation on structural constitution.

13393 OFHC Brand Copper. 122 p. 1957. American Metal Co., New York. (TN780 Am35t)

A summary of available information on the characteristics of oxygen-free, high-conductivity Cu. Includes effects of impurities, metallography, methods of analysis, and methods of testing.

13394* (French.) Chromium and Manganese Additions in 3 and 5% Magnesium Light Aluminum Alloys. **Additions de chrome et de manganèse dans les alliages légers d'aluminium à 3 et 5% de magnésium.** A. Guilhaudis and R. Develay. *Revue de Métallurgie*, v. 54, Apr. 1957, p. 288-298.

From consideration of transformation properties, mechanical and sheet stamping characteristics, weldability, and corrosion resistance it is possible to determine the Cr and Mn contents practical for industrial use.

13395 Symposium on Metallic Materials for Service at Temperatures Above 1600 F. 193 p. 1956. American Society for Testing Materials, Philadelphia. (TA460 Am35sm)

Fourteen papers on properties of such materials as TiC, nimonic alloy, Co alloys, Zr-rich protective coatings, and Inconel and Cr-Ni alloys.

13396* An Exposition of Alloy Steels for the Engineer. J. S. Vatchagandhy. *TISCO*, v. 4, Apr. 1957, p. 63-73 + 2 plates.

Effects of alloying elements on hardenability, tensile strength, and temper brittleness.

13397 Molybdenum. A Materials Survey. Wilmer McInnis. *U. S. Bureau of Mines, Information Circular* 7784, Apr. 1957, 77 p. (TN21 Un3i)

History; geology and resources; supply and demand; mining, beneficiation, and metallurgy; production; forms; properties and uses; world trade; controls.

13398* (German.) Application of Radioactive Isotopes in the Physics of Metals. **Über die Anwendung radioaktiver Isotope in der Metallphysik.** I. Kulikow. *Wissenschaftliche Annalen*, v. 6, Apr. 1957, p. 246-256.

Review of the main fields in studies of metals and alloys where radioactive isotopes can be used to good advantage.

See also: **13162** (Ca production statistics); **14005** (variance analysis of experimental results).

METALS—CORROSION

13399 (English.) **Oxidation of Hafnium.** W. W. Smeltzer and M. T. Simnad. *Acta Metallurgica*, v. 5, June 1957, p. 328-334.

Oxidation rates at 760-mm. O pressure in the temperature range 350 to 1200 C are represented by logarithmic, parabolic, and linear-rate equations. The logarithmic and parabolic relationships describe formation of compact oxide, whereas the linear relationship describes formation of porous oxide.

13400* Corrosion in Domestic Water Heaters. Robert C. Weast. *American Gas Journal*, v. 184, July 1957, p. 27-28.

Effects of tank capacity, Cu dip tubes, tank style, Zn thickness (in galvanized tanks), water storage temperature, and tap water on corrosion.

13401 Corrosion of Materials in the Presence of Fluorine at Elevated Temperatures. Martin J. Steindler and Richard C. Vogel. *Argonne National Laboratory (U. S. Atomic Energy Commission)*, ANL-5662, Jan. 1957, 21 p. (UF767 Un3.1an Contin.)

Nickel and Monel are suitable materials for use in a F atmosphere at temperatures up to 550 C. At higher temperatures Ni and Cu exhibited the lowest corrosion rates. Ceramic materials such as CaF_2 and alumina resist attack by F even at the highest temperatures, but lack mechanical strength.

13402 Corrosion of Uranium-Zirconium Alloys in Water at Temperatures up to 100 C. H. A. Pray and W. E. Berry. *Battelle Memorial Institute (U. S. Atomic Energy Commission)*, BMI-893, Dec. 1953, 26 p. (UF767 U3b Contin.)

Under certain conditions U 5 w/o Zr alloys show remarkable corrosion resistance. The alloy must be quenched rapidly (in water or oil) from above 700 C.

13403 Corrosion of High-Temperature Alloys in Sulfur-Bearing Cracked-Ammonia Atmospheres. G. Lee Ericson, Walter J. Braun Frederick W. Fink, and Robert S. Peoples. *Battelle Memorial Institute (U. S. Atomic Energy Commission)*, BMI-1179, Apr. 1957, 32 p. (UF767 U3b Contin.)

The presence of S in quantities up to 350 grains per 100 ft.^{3} of cracked ammonia containing 43 volume % of water vapor does not increase the corrosion of any of the stainless alloys subjected to tests at temperatures from 1200 to 1800 F. Any property changes are a function of temperature.

13404 Corrosion Protection for Oil Pipe Lines. II. D. M. Allan and J. S. Gray. *Chemistry in Canada*, v. 9, June 1957, p. 76 + 5 pages.

Covers coating conductance, casings, insulating flanges, example calculations using the proposed standard, graphs and interpretation of potential measurements on Trans Mountain's oil pipe line, and future investigations planned.

13405 The Corrosion of Iron in High-Temperature Water. I. Corrosion Rate Measurements. D. L. Douglas and F. C. Zynes. *Corrosion*, v. 13, June 1957, p. 361t-374t.

13406 Corrosion of Stainless Steels in Supercritical Water. W. K. Boyd and H. A. Pray. *Corrosion*, v. 13, June 1957, p. 375t-384t.

The behavior of stainless steels, including both hardenable and nonhardenable grades, in degassed super-critical water at 800, 1000, and 1350 F and a pressure of 5000 psi. is described. In general, the corrosion at 1350 F observed for the alloys was found to be intergranular, while at 1000 F, only Inconel X exhibited selective penetration along grain boundaries. All alloys suffered some decarburization and carbide precipitation after exposure to supercritical water at 1350 F. No significant phase changes were observed at 800 and 1000 F. The Armco 17-4PH, Armco 17-7PH, and Hastelloy F alloys were the most resistant materials at 1350 and 1000 F. All of the alloys evaluated had excellent resistance to 800 F degassed supercritical water. The AISI type 316 material was shown to be susceptible to stress-corrosion cracking at 1350 F.

13407 Some Case Histories of Stress Corrosion Cracking of Austenitic Stainless Steels Associated With Chlorides. H. R. Copson and C. F. Cheng. *Corrosion*, v. 13, June 1957, p. 397t-404t.

Some 22 case histories of stress corrosion cracking in Types 302, 304, 316, 321, and 347 stainless steels are presented. These occurred in water, steam, brines, and miscellaneous solutions. In each case, either the chloride content was high initially, or conditions were such that chlorides could concentrate. Usually the temperature was quite high.

13408 A Corrosion Problem in Large Steam Generating Stations. T. J. Finnegan. *Corrosion*, v. 13, June 1957, p. 405t-409t.

Internal corrosion of boiler tubes. Methods of minimizing the attack, including feedwater additives and cleaning of tubes with HCl.

13409 Shipboard Evaluation of Zinc Galvanic Anodes Showing the Effect of Iron, Aluminum and Cadmium on Anode Performance. E. C. Reichard and T. J. Lennox, Jr. *Corrosion*, v. 13, June 1957, p. 410t-416t.

Long-term performance tests on five active ships and some quiescent marine exposures, using commercial size zinc anodes.

13410 Corrosion in Light Oil Storage Tanks. E. H. Tandy. *Corrosion*, v. 13, July 1957, p. 427t-432t.

Data to show the relationship between stocks contained in tanks vs. corrosion rate, and size and location of tanks vs. corrosion rate. Various control measures are considered.

13411 Cathodic Protection of Internals of Ships. L. P. Sudrabin. *Corrosion*, v. 13, July 1957, p. 466t-472t.

Application in ships of cathodic protection to internal tanks used for sea water ballast.

13412 The Performance of Alcan-65S-T6 Aluminum Alloy Embedded in Certain Woods Under Marine Conditions. T. E. Wright, H. P. Godard, and I. H. Jenks. *Corrosion*, v. 13, July 1957, p. 481t-487t.

The relative corrosivity to Al of tested woods is: rock elm (least), mahogany, and British Columbia fir (most). The complete paint system of sealer + barrier layer + Cu antifouling paint provided maximum protection.

13413* (French.) New Aspects of Metal and Alloy Oxidation at High Temperatures. **Nouveaux aspects de l'oxydation des métaux et alliages aux températures élevées.** J. Bénard. *Corrosion et Anticorrosion*, v. 5, May 1957, p. 138-145.

Nucleating process when the oxide film begins to form. Changes in the surface microstructure of the metal after being exposed for a long time to a very slightly oxidizing atmosphere. Practical consequences.

13414 Anodic Corrosion and Hydrogen and Oxygen Overvoltage on Lead and Lead Antimony Alloys. R. Rüetschi and B. D. Cahan. *Electrochemical Society, Journal*, v. 104, July 1957, p. 406-413.

The amount of PbO_2 formed during anodization can be evaluated by measuring the length of the potential plateau of the $PbO_2/PbSO$ couple produced during discharge.

13415 Oxidation of Iron-Nickel Alloys. II. Electron Diffraction at High Temperature. R. T. Foley, C. J. Guare, and H. R. Schmidt. *Electrochemical Society, Journal*, v. 104, July 1957, p. 413-417.

Oxidation of alloys containing 30, 41, and 78% Ni were studied at temperatures of 600, 700, 800, and 900 C.

13416 The Activation and Passivation of Stainless Steel in Aerated Sulfuric Acid. G. H. Cartledge. *Electrochemical Society, Journal*, v. 104, July 1957, p. 420-426.

Potential-time curves were determined at 85 C for a Nb-stabilized stainless steel during its transition to the state that is essentially stable in aerated 0.1 N H_2SO_4.

13417 Metal-Water Reactions. V. Kinetics of the Reaction Between Magnesium and Water Vapor. Harry J. Svec and Dale S. Gibbs. *Electrochemical Society, Journal*, v. 104, July 1957, p. 434-439.

Rate constants were found to be linearly dependent on the water vapor pressure. The activation energy varied with both temperature and water vapor pressure, increasing as the temperature was increased and the water vapor pressure was decreased.

13418 High Temperature Oxidation of High Purity Nickel Between 750 and 1050 C. Earl A. Gulbransen and Kenneth F. Andrew. *Electrochemical Society, Journal*, v. 104, July 1957, p. 451-454.

Failure occurs above 900 C, at which temperature the parabolic rate law constant has a value of 1.88×10^{-11} $(g/cm^2)^2/sec.$ and a film thickness value of 400-600 $\mu g/cm^2$.

13419 Researches on Corrosion and Inhibition. Adsorption, Inhibition and the Langmuir Equation. George S. Gardner. *Franklin Institute Journal* v. 263 June 1957, p. 523-536.

The velocity of corrosion of steel was studied in dilute acetic acid, in the presence of an oil phase, and in the presence and absence of an organic inhibitor. Values of the fractional surface covered by adsorbed inhibitor are calculated from the experiments for each inhibitor concentration.

13420* (Czech.) Corrosion and Metallurgy. **Korose a hutnictví.** Milič Roubal. *Hutnické Listy*, v. 12 May 1957, p. 414-417.

Effects of metallurgical processing on speed of corrosion.

13421* (Czech.) Relation Between the Corrosion of Mining Cables and Methods of Their Manufacture. **Souvislost výroby důlních lan s jejich korosí.** Emil Hila and Josef Teindl. *Hutník*, v. 7, May 1957, p. 158-161.

Corrosion of mining cables from the point of view of melting practice, structure, grain size, components, method of drawing, quality of surface of material, martensite formation, quality of lubrication, patenting, and effect of H.

13422* (English.) **Investigation on Acid-Resistant High-Silicon Iron. III. Effects of Cooling Rate and Annealing on Mechanical Properties and Corrosion Resistance.** Hiroshi Sawamura, Osamu Tajima, and Kyoichi Akamatsu. *Kyoto University, Memoirs of the Faculty of Engineering*, v. 19, Apr. 1957, p. 77-91.

Variations in cooling rate affect graphite structure and mechanical properties but not corrosion resistance.

13423* (Russian.) The Corrosion Resistance of Metals in Petroleum Gases Containing Hydrogen Sulfide. **Korrozionnaia stoikost' metallov v srede neftianogo gaza soderzhashchego**

serovodorod. V. M. Nikiforova and N. A. Reshetkina. *Metallovedenie i Obrabotka Metallov*, no. 5, May 1957, p. 55-62.

Attempts to find a corrosion-resistant steel capable of withstanding petroleum gases containing H_2S.

13424 Factors in the Selection of Corrosion Resistant Materials. F. L. Whitney, Jr. *Metal Progress*, v. 1, June 1957, p. 90-96.

Ease of fabrication, corrosion rate, and cost are most important items.

13425 Corrosion and Cathodic Protection. H. V. Beezley and G. R. Olson. *Petroleum Engineer (Management Ed.)*, v. 29, June 1957, p. D28-D34.

Accepted methods for controlling corrosion on pipeline systems.

13426 Cathodic Protection Handbook. Oliver Osborn, C. F. Schrieber, W. B. Brooks, R. C. Jorgensen, and Burke Douglas. *Petroleum Refiner*, v. 36, June 1957, p. 115-128.

Fundamentals of cathodic protection; field measurements; galvanic protection of condenser and heat exchanger heads; cathodic protection of miscellaneous marine equipment and underground pipe lines; costs.

13427 The Dissolution of Germanium by Molten Indium. B. Goldstein. *RCA Review*, v. 18, June 1957, p. 213-220.

Experiments were performed on dissolution as a function of crystal axis, temperature, and Ge concentration of the solvent. Plots of Ge dissolution vs. time are generally characterized by two regions indicating initial and final rates.

13428* (Polish.) Stress Corrosion Cracking of Brass. **Pękanie korozyjne mosiądzu.** Cyryl Niewiadomski. *Rudy i Metale Niezelazne*, v. 2, Mar. 1957, p. 13-20.

General discussion of uses of brass; theory and causes of stress corrosion.

13429* (Russian.) Effect of Ambient Medium on Corrosion Resistance of Austenite Steel After Its Plastic Deformation. **Vliianie sredy na korrozliiniiu ustoichivost' austenitnykh stalei posle plasticheskoi deformatsii.** D. Ia. Kagan and T. A. Mikhailova. *Teploenergetika*, v. 4, June 1957, p. 35-39.

Study of the effect of alkaline compounds on steam supply pipes and steam heaters at high temperatures.

13430 Underground Corrosion. Melvin Romanoff. National Bureau of Standards Circular 579. 227 p. 1957. Available from Superintendent of Documents, U. S. Government Printing Office, Washington, D. C. (TA462 R66u)

Electrical and electrochemical aspects of underground corrosion have been continuously studied. Results from both field and laboratory investigations are presented.

13431 Corrosion Resistance of Zircaloy-2 Brazements in High-Temperature Water. J. B. McAndrew, H. Schwartzbart, and R. Necheles. *Welding Journal*, v. 36, June 1957, p. 278s-290s.

Several alloys were found to produce brazements which exhibit negligible corrosion when tested in 680 F pressurized water for periods up to and exceeding 1200 hrs.

13432* (German.) Influence of Wetting Agents on the Corrosion of AlMg7 With Special Consideration to Fatigue Corrosion. **Einfluss von Netzmitteln auf die Korrosion von AlMg7 unter besonderer Berücksichtigung der Ermüdungskorrosion.** Erich Gebhardt and Horst Beyer. *Zeitschrift für Metallkunde*, v. 48, May 1957, p. 232-240.

Influence of various wetting agents on corrosion behavior in several corrosion agents is investigated in dipping, stress corrosion, and fatigue corrosion tests.

13433* (German.) Stress Corrosion Tests on AlZnMgl. **Spannungskorrosionsversuche an AlZnMgl. I.** Influence of Heat Treatment, Forming, and Anodic Oxidation. **Einfluss von Wärmebehandlung, Verformung und anodischer Oxydation.** Kurt Dies and Ruth Zimmermann. *Zeitschrift für Metallkunde*, v. 48, May 1957, p. 288-296.

Lever test pieces of AlZnMgl in cold-hardened and warm-hardened state were investigated in a 3% NaCl solution. The service life of cold hardened specimens is strongly stress-dependent.

13434* (Russian.) The Mechanism of Metal Corrosion Under Thin Layers of Electrolytes. **O mekhanizme korrozii metallov pod tonkimi sloiami elektrolitov.** I. L. Rosenfel'd and T. I. Pavlutskaya. *Zhurnal Fizicheskoi Khimii*, v. 31, Feb. 1957, p. 328-339.

The corrosion current of elements in thin layers of electrolyte (70 to 165μ) is determined by the rate of the cathode process. The over-all corrosion current in thin layers is less than during complete immersion of the element in the solution, but the current density at the site of contact of the electrodes is higher for films than bulk solutions.

13435* (Russian.) The Resistance of Metal Solid Solutions to Corrosion. **Issledovanie korrozionnoi stoikosti tverdykh rastvorov metallov. III.** Cd-Hg System. **Sistema Cd-Hg.** N. N. Gratsianskii and M. L. Kaplan. *Zhurnal Fizicheskoi Khimii*, v. 31, Feb. 1957, p. 418-423.

Alloy composition vs. corrosion resistance diagram reveals the existence of a corrosion resistant boundary in 1% HCl beginning with 40% Hg. No such boundary is apparent in the case of 3% NaCl.

13436* (Russian.) Corrosion of Iron in Hydrochloric Acid in the Presence of Inhibitors at Different Temperatures. **O korrozii zheleza v solianoi kislote v prisutstvii ingibitorov pri raznykh temperaturakh.** I. P. Anoshchenko. *Zhurnal Prikladnoi Khimii*, v. 30, no. 4, Apr. 1957, p. 523-528.

The gravimetric method (for temperatures from 20 to 80 C) and the volumetric method (at 20 C) were applied to investigate the effect of additions of urotropine, acridine, potassium bromide, and methyl alcohol.

See also: **13282** (corrosion inhibitors for boiler feedwater).

METALS—EXTRACTION AND REFINING

13437* The Preparation of Dilute Binary Alloys and the Determination of Their Composition. A. N. Gerritsen, G. J. Los, and J. M. L. C. Van der Aa. *Applied Scientific Research*, v. 6, sec. A, nos. 5-6, 1957, p. 385-392.

Modified radiation vacuum furnace is suitable for melting small amounts of binary alloys. Effective concentration of the solute can be determined using the average temperature coefficients of resistivity between 273 and 373 K of the alloys and the basic metal, and Linde's data for the atomic resistivity increase and its temperature coefficient.

13438* (Russian.) Mechanism of Formation of Zirconium Sponge During Preparation of Zirconium by the Thermomagnesium Process. **O mekhanizme obrazovaniia tsirkonievoi gubki pri magnietermicheskom protsesse polucheniia tsirkoniia.** F. G. Reshetnikov and E. H. Oblomeev. *Atomnaia Energiia*, v. 2, May 1957, p. 459-462.

Studies using tracer atoms of additives such as Al and Pb, which were introduced into the reducing medium.

13439 Injection of Lime Through the Blast-Furnace Tuyeres. Paul B. Stubbs. *Blast Furnace and Steel Plant*, v. 45, June 1957, p. 599 + 2 pages.

Design of injection equipment. Test results indicate that injecting lime through the furnace tuyeres is not a promising method for controlling sulfur or for improving smoothness of furnace operation.

13440 Process and Quality Control for Management. Walter T. Hayter. *Blast Furnace and Steel Plant*, v. 45, June 1957, p. 601-607.

Need for quality control, sources of defects in sheets and electrolytic tinplate; rolling mill production factors and cost considerations. (To be continued.)

13441 Investigation of the Desulfurization of Pig Iron With Sodium Carbonate. O. V. Travin and L. A. Shvartsman. *Henry Brutcher Translation No.* 3865, 15 p. (From *Izvestiia Akademii Nauk SSSR*, no. 12, Dec. 1953, p. 1804-1812.) Henry Brutcher, Altadena, Calif.

Previously abstracted from original. See item 14440, v. 3, Oct. 1954.

13442* Experiments on Increasing the Capacity of Continuous-Casting Molds for Steel. K. G. Speith and A. Bungeroth. *Henry Brutcher Translation No.* 3871, 11 p. (From *Forschungs-Berichte des Wirtschafts-und Verkehrsministeriums Nordrhein-Westfalen*, no. 234, 1956, p. 1-15.) Henry Brutcher, Altadena, Calif.

Effect of different mold tapers, bar withdrawal speeds, casting temperatures, and longitudinal corrugations in mold walls.

13443 Melting of High-Purity Iron by the Carbon Reduction Process and Notch Toughness vs. Temperature Curves of This Iron. W. A. Fisher, H. Treppschuh, and K. H. Köthemann. *Henry Brutcher Translation No.* 3877, 21 p. (From *Archiv Eisenhüttenwesen*, v. 27, no. 9, 1956, p. 567-572.) Henry Brutcher, Altadena, Calif.

Previously abstracted from original. See item 926, v. 6, Jan. 1957.

13444 Gas Cutting of Steel in Continuous Casting Machines. O. Sh. Spektor. *Henry Brutcher Translation No.* 3888, 14 p. (From *Stal'*, v. 16, no. 11, 1956, p. 1042-1048.) Henry Brutcher, Altadena, Calif.

Previously abstracted from original. See item 2883, v. 6, Feb. 1957.

13445 Vacuum Melting of Steels and Other Iron-Base Alloys. H. Zakowa. *Henry Brutcher Translation No.* 3890, 21 p. (From *Prace IMH (Instytutow Ministerstwa Hutnictwa)*, v. 8, no. 8, 1956, p. 207-214.) Henry Brutcher, Altadena, Calif.

Previously abstracted from original. See item 955, v. 6, Jan. 1957.

13446 Oxidation of Manganese Dissolved in Liquid Iron. B. V. Linchevskii and A. M. Samarin. *Henry Brutcher Translation No.* 3893, 5 p. (From *Doklady Akademii Nauk SSSR*, v. 110, no. 2, 1956, p. 209-211.) Henry Brutcher, Altadena, Calif.

Equilibrium of solutions of Fe in Mn with a steam-hydrogen mixture at 1565 and 1605 C.

13447 Reduced-Pressure Treatment of Molten Steel on Plant Scale. F. Harders, H. Knüppel, and K. Brotzmann. *Henry Brutcher Translation No.* 3900, 20 p. (From *Stahl und Eisen*, v. 76, no. 26, 1956, p. 1721-1728.) Henry Brutcher, Altadena Calif.

Progress of degassing treatment and results of trials. Characteristics of vacuum-degassed steel and performance of steel in actual service.

13448 Fundamentals and Operating Data on Production of Steel in a Rotary Furnace. R. Graef. *Henry Brutcher Translation No.* 3910, 24 p. (From *Stahl und Eisen*, v. 77, no. 1, 1957, p. 1-10.) Henry Brutcher, Altadena, Calif.

Development and metallurgy of a rotary furnace. Removal of S, C, P, Si, and Mn is compared with that of other steel-making processes.

13449 Degassing of Steel in Vacuum. H. Zakowa and R. Radźwicki. *Henry Brutcher Translation No.* 3921, 9 p. (From *Biuletyn Informacyjny, Hutnik, Poland*), v. 7, no. 11, 1956, p. 41-45.) Henry Brutcher, Altadena, Calif.

Polish work on the extent to which molten steel can be degassed by various methods.

13450* (Czech.) Continuous Casting of Copper Alloy Rods and Tubes. **Plynulé lití tyčí a trubek ze slitin mědi.** Vladimír Tlusták and Petr Jičinský. *Hutnické Listy*, v. 12, May 1957, p. 473-480.

A method based on the Asarco principle. A machine and the technology of the process are described.

13451* (Czech.) Possibility of Utilization of Heat During the Cooling of Open-Hearth Furnaces. **Možnosti využití tepla při chlazeni Martinových pecí.** Rudolf Kremer. *Hutník*, v. 7, May 1957, p. 152-157.

The great quantity of water required, and the large loss of heat in water cooling of open-hearth furnaces is discussed. Replacement of water cooling by an evaporation system with natural and forced circulation. New ways of utilization of heat by using liquids with high or low boiling point.

13452 Special Bar Raises Killed Steel Yield. R. G. Brown. *Iron Age*, v. 170, July 4, 1957, p. 88-89.

An Al bar placed in the ingot mold during pouring is designed to melt uniformly as molten metal runs into the mold.

13453 Experimental Results With Hollow Electrodes in Electric Steel Furnaces. W. E. Schwabe. *Iron and Steel Engineer*, v. 34, June 1957, p. 84-92.

Hollow electrodes will give a steadier arc, faster melting, and lower power requirements, but a higher electrode consumption rate.

13454 Economics of Oxygen Generating Stations for a Steel Mill. High and Low Purity Oxygen Applications. Arthur E. Steele and Donald E. Cummings. *Iron and Steel Engineer*, v. 34, June 1957, p. 114-124.

13455 Basic Hot Blast Cupola as Source of Hot Metal for Steel Plants. E. S. Harman and Siegfred Tunden. *Iron and Steel Engineer*, v. 34, June 1957, p. 159-166.

Effect of cupola metal upon open-hearth production rates and costs.

13456 Oxygen Lancing of Pig Iron and Subsequent Fume Treatment With a Pease-Anthony Venturi Scrubber. P. K. Gledhill, P. J. Carnall, and K. H. Sargent. *Iron and Steel Institute, Journal*, v. 186, June 1957, p. 198-211.

13457 Influence of Slag Properties on Pig-Iron Composition. A. J. Burgess and B. G. Baldwin. *Iron and Steel Institute, Journal*, v. 186, June 1957, p. 227-235.

13458* (Swedish.) Steel Refining With Oxygen in Rotating Furnace According to the Kaldo Process. **Syrgasfärskning i roterande ugn enligt Kaldo-processen.** Bo Kalling and Folke Johansson. *Jernkontorets Annaler*, v. 141, no. 4, 1957, p. 189-205.

Method of refining ordinary high phosphorus basic Bessemer pig iron into steel comparable in quality with open-hearth steel.

13459 Diffusion of Calcium and Silicon in a Lime-Alumina-Silica Slag. Helen Towers and John Chipman. *Journal of Metals*, v. 9; *American Institute of Mining and Metallurgical Engineers, Transactions*, v. 209, June 1957, p. 769-773.

Using the capillary method, the diffusion constants of Ca and Si at 1430 C were determined to be 1×10^{-8} sq. cm. per. sec. in a slag of 39% CaO, 40% SiO_2, 21% Al_2O_3. Heats of activation are approximately 70 kcal.

13460 Some Notes on Oroya Copper Slags. I. L. Barker, J. S. Jacobi, and B. H. Wadia. *Journal of Metals*, v. 9; *American Institute of Mining and Metallurgical Engineers, Transactions*, v. 209, June 1957, p. 774-780.

A study of the interrelationship between Cu and magnetic content of reverberatory slags.

13461 Reduction of Nickel by Hydrogen From Ammoniacal Nickel Sulfate Solutions. V. N. Mackiw, W. C. Lin, and W. Kunda. *Journal of Metals*, v. 9; *American Institute of Mining and Metallurgical Engineers, Transactions*, v. 209, June 1957, p. 786-793.

Thermodynamics of the reaction by which Ni can be precipitated from aqueous ammoniacal $NiSO_4$ solutions by H at elevated pressures and temperatures. A mechanism for the catalytic effect of ferrous salt additions. Effect of variables on the autocatalytic nature of the reduction.

13462* (Russian.) Blast Furnace Operation Using Oxygen-Enriched Blast. **Rabota domennykh pechei na dut'e obogoshchennom kislorodom.** F. A. Khilkevich, B. L. Lazarev, and S. B. Bazilevich. *Metallurg*, no. 6, June 1957, p. 3-7.

Smelting of pig iron for steel manufacture. Smelting of ferromanganese with use of acid slags.

13463* (Russian.) Deoxidation of Rimmed Steel in the Ladle by Means of Ferromanganese. **Raskislenie kipiashchei stali ferromargantsem v korshe.** D. S. Gerchikov, A. M. Ofengenden, and L. M. Pokrass. *Metallurg*, no. 6, June 1957, p. 13-15.

A decrease in steel costs is obtained by this method, eliminating deoxidation in the furnace, and using less ferromanganese and a shorter melting time. The metal quality is not affected.

13464* (Russian.) Using Agglomerate in Open-Hearth Melting. **Primenenie aglomerata v martenovskoi plavke.** N. A. Vecher, A. A. Lebedev, and N. D. Korneev. *Metallurg*, no. 6, June 1957, p. 17-19.

Properties of iron ore agglomerates. Partial and complete replacement of open hearth ore by agglomerate. Using agglomerate in melting all types of steel.

13465* (Russian.) Thin-Walled Molds for Killed Steel Castings. **Tonkostennye izlozhnitsy dlia razlivki spokoinoi stali.** A. M. Danilov. *Metallurg*, no. 6, June 1957, p. 19-20.

Advantages of thin-walled molds. Quality of steel does not depend on the type of mold.

13466 Contribution to the Floating Zone Refining of Silicon. E. Buehler. *Review of Scientific Instruments*, v. 28, June 1957, p. 453-460.

Equipment features a simple mechanical drive, a switching panel to recycle the apparatus, and a self-stabilizing r.f. heating circuit to maintain constant zone length. Silicon containing less than 1 part per billion of electrically active impurities was prepared.

13467* (French.) A Study of Desulfurization in a Basic Bessemer Steel Plant. **Etude de la désulfuration a l'aciérie Thomas.** A. Decker. *Revue Universelle des Mines*, v. 13, ser. 9, no. 5, May 1957, p. 165-212.

A practical study of desulfurizing iron before refining and a theoretical study of the thermodynamic equilibria of the constituents of steel and slag at the end of the conversion process.

13468 (German.) Deoxidation and Technological Characteristics of Killed Basic Converter Steels. **Desoxydation und technologische Eigenschaften beruhigter Thomasstähle. I.** Deoxidation Process as Well as Aspect and Composition of the Deoxidation Products. **Desoxydationsablauf sowie Aussehen und Zusammensetzung der Desoxydationsprodukte.** Erwin Plöckinger and Rupert Rosegger. *Stahl und Eisen*, v. 77, May 30, 1957, p. 701-714.

Deoxidation phenomena and separation of the reaction residues in the deoxidation of steels with Si, Si and Al combined, and with Al alone. Representation of the results obtained with low and high carbon steels by means of three-dimensional diagrams. Contents of inclusions as dependent on the amount of Al added.

13469* (Russian.) The Influence of Ultrasonic Waves on the Structure and Properties of a Steel Ingot. **Vliianie ul'trazvuka na strukturu i svoistva stal'nogo slitka.** Ia. B. Gurevich, V. I. Leont'ev, and I. I. Teumin. *Stal'*, v. 17, May 1957, p. 406-411.

A considerable improvement of macro- and micro-structures of X27 and X25H20 steels, as well as of their mechanical properties and workability, was observed on treating the molten metal with ultrasonic waves during its crystallization.

13470* Possibilities of Desulphurizing Blast-Furnace Hot Metal. I. By Additions of Aluminium Near the Iron Notch During Casting. A. Banerjee, V. G. Paranjpe, and S. Visvanathan. **II. By Injecting Fluidized Agents.** P. K. Chakravarty, V. G. Paranjpe, and S. Visvanathan. *TISCO*, v. 4, Apr. 1957, p. 74-88.

High Si and Ti contents in the pig iron diminished effectiveness of Al additions. The desulfurizing capacity of low or medium grades of lime can be markedly improved by adding either calcium silicide, fluorspar, fluorspar plus carbon, or Al.

13471* Distribution of Titanium Between Blast-Furnace Metal and Slag. P. Mehta and V. G. Paranjpe. *TISCO*, v. 4, Apr. 1957, p. 95-99.

Factors affecting distribution. Material balance for Ti. Influence of temperature, slag basicity, and titania content of slag on the extent of Ti reduction. Correlation among the reducibilities of Ti, Si, and Mn.

13472* (Russian.) Reactions Between Alloy and Slag in Fe-Co-O and Fe-Ni-O Systems. **Reaktsii mezhdu splavom i shlakom v sistemakh Fe-Co-O i Fe-Ni-O.** N. I. Gran' and A. A. Tseidler. *Tsvetnye Metally*, v. 30, Apr. 1957, p. 44-49.

Dependence of the contents of Ni and Co in slag on their contents in the alloy at 1500 to 1600 C. Dependence of the equilibrium constants of the reactions: $Fe + CoO \leftrightarrows FeO + Co$ and $Fe + NiO \rightleftarrows FeO + Ni$ on temperature.

13473* (Russian.) Acid-Base Properties of Metallurgical Slag. **Kislotno-osnovnye svoistva metallurgicheskikh shlakov.** L. A. Shvartsman and I. A. Tomilin. *Uspekhi Khimii*, v. 26, May 1957, p. 554-567.

Study of acid-base properties of oxides and their mixtures.

See also: **12581** (life of blast furnace linings); **12587** (arc-furnace roof refractories); **12602** (melting Ni-Cr-Co alloy); **13391** (automatic control of blast furnaces).

METALS—FINISHING, POLISHING, AND CLEANING

13474* Some Aspects in the Production and Measurement of Surface Finish. M. A. Chapple. *Australasian Engineer*, v. 49, May 1957, p. 57 + 3 pages.

Precision grinding; diamond lapping; types of machines used to check surface finish.

13475* Ultrasonic Cleaning Installation Handles Production Quantities. *Automation*, v. 4, July 1957, p. 55-58.

Cleaning cycle consists of three main stages: initial cleaning by boiling solution and spray in dip chamber; follow-up cleaning in solution subject to ultrasonic irradiation and in second spray; and final cleaning by vapor.

13476 Cleaning and Treating Metals To Be Painted. II. P. C. Bardin. *Industrial Finishing*, v. 33, June 1957, p. 42 + 7 pages.

Blast cleaning; phosphate coating; ultrasonic cleaning; anodizing Al.

13477* Maize Cellulose. William V. Karr. *Industrial Finishing (London)*, v. 9, June 1957, p. 642-644.

Use of maize cellulose in the plating and finishing industry for drying, polishing, and burnishing and as a filler, conditioner, and absorbent.

13478 The Nature of Mechanically Polished Metal Surfaces. Deformation Produced During Abrasion of 18/8 Type Austenitic Steel. L. E. Samuels and G. R. Wallwork. *Iron and Steel Institute, Journal*, v. 186, June 1957, p. 211-218.

The structure of the deformed surface layer produced during the abrasion was investigated by a metallographic taper-sectioning technique. Requirements of mechanical methods of polishing necessary for the production of surfaces free from gross deformation are considered.

13479* General Practices of Metal Surface Prepaint Preparation. J. H. Geyer. *Official Digest. Federation of Paint and Varnish Production Clubs*, v. 29, June 1957, p. 533-541.

Sand blasting; steel wool; alkali wash; vapor degreasing; solvent wipe; phosphoric acid; iron phosphating process; Zn phosphate film; Alodine processes.

13480* (Polish.) Pickling of 1H13 Steel in Fused Salts. **Trawienie stali 1H13 w stopionych solach.** E. Gasior. *Prace Instytutów Ministerstwa Hutnictwa*, no. 2, 1957, p. 61-69.

Equipment and methods of pickling. Structure and chemical properties of scale formed during annealing in air at 900 C.

13481* Phosphating Processes and Their Applications in Metal Finishing. I. General Principles. D. F. Fishlock. *Product Finishing*, v. 10, June 1957, p. 65-76.

Deals with their early development, basic theory, and chief uses.

13482 How to Select and Use Contact Wheels. Warren K. Seward. *Products Finishing*, v. 21, July 1957, p. 24-35.

Discusses contact wheels for abrasive belt polishing from the standpoint of application; proper techniques for economical operation.

13483* (Polish.) Technology of Flame Cleaning of Steel Ingots and Blooms. **Technologia ogniowego oczyszczania wlewków i kęsisk stalowych.** Franciszek Gałczyński. *Wiadomości Hutnicze*, v. 13, Apr. 1957, p. 99-102.

Description and use of cleaning equipment. Ingot defects and their detection.

See also: **12982** (blast cleaning of metals); **13067** (polishing of Al); **13519** (finishing of springs).

METALS—FOUNDRY PRACTICE

13484 The Development of Cast Fuel Elements. H. A. Saller, R. F. Dickerson, A. W. Hare, and N. E. Daniel. *Battelle Memorial Institute (U. S. Atomic Energy Commission)*, BMI-983, Feb. 1955, 26 p. (UF767 U3b Contin.)

The casting of perforated-hexagon subsections which were 2 and 4 in. high and about 3.9 in. across the flats was found to be practical. The optimum casting conditions for the Cr-U eutectic alloy were at a pouring temperature of 2000 F and a graphite mold temperature of 1600 F. Gravity casting of 24 in. long grooved-plate subsections in split-type preheated graphite molds was not completely successful.

13485* Observations on the Melting and Casting of Aluminium-Bronze Alloys With Special Reference to Test Bars. C. V. Wilson and E. V. Tull. *British Foundryman*, v. 50, pt. 5, May 1957, p. 237-245.

Difficulties encountered in melting and casting, and general principles for their solution. Factors affecting soundness. Influence of casting temperature and variations in composition upon physical properties.

13486* The Heterogeneous Distribution of Oxygen in Cast Iron. G. Blanc and A. Blondel. *British Foundryman*, v. 50, pt. 5, May 1957, p. 245-257.

Vacuum fusion equipment and procedures. Effect on O contents of sampling procedure in relation to location of the samples, methods of casting, conditions of storage, and types of mold material.

13487* Aids to Production in a Jobbing Foundry. I. Rees and D. H. Snelson. *British Foundryman*, v. 50, pt. 5, May 1957, p. 267-288.

The core-assembly method of molding, the CO_2 process, and the application of the moldable type of exothermic feeding compound are discussed from the point of view of flexibility and increase of productivity.

13488* Production of Machine-Tool Castings. G. W. Nicholls. *British Foundryman*, v. 50, pt. 6, June 1957, p. 296-308.

Manufacturing methods used for castings such as heavy boring machines, heavy planing machines, and heavy-duty radial drilling machines.

13489* The Hot-Blast Cupola as an Economic Unit for Producing Castings to B. S. 1452, Grade 12. J. Henderson. *British Foundryman*, v. 50, pt. 6, June 1957, p. 309-323.

Plant layout, instrumentation, charge composition, metallurgical control, and cupola maintenance in a plant producing castings to B. S. 1452, Grade 12 specifications for the textile and general engineering industries.

13490 Experiments on Oxygen Enrichment of the Blast for Cupolas. M. Vilgus and V. Otohal. *Henry Brutcher Translation* No. 3889, 3 p. (From *Slévárenství*, v. 2, no. 10, 1954, p. 292-296.) Henry Brutcher, Altadena, Calif.

Previously abstracted from original. See item 4148, v. 4, Mar. 1955.

13491 Brass Casting Design From the Foundry Viewpoint. Harry St. John. *Foundry*, v. 85, July 1957, p. 91-93.

13492 A New Method for Studying Riser Requirements of Castings. John Varga, Jr. *Foundry*, v. 85, July 1957, p. 106-109.

Plotting test data on log-log coordinates, and selecting suitable parameters for the coordinates produces a straight line which simplifies determination of sizes of risers required for a wide variety of simple casting shapes and sizes.

13493 Uses of Cast Iron and Other Materials as Denseners in the Production of Machine-Tool Castings. Brian Kirby. *Foundry Trade Journal*, v. 102, June 20, 1957, p. 749-754.

Practical research work reveals advantages for SiC over cast iron for use as chills in molds.

13494* (German.) Studies on the Susceptibility of Magnesium Die-Castings to Shrinking and Cracking. **Über die Lunker- und Rissanfälligkeit von Magnesium-Druckguss.** K. E. Mann. *Giesserei*, v. 44, May 23, 1957, p. 301-305.

Causes of hot tears and stress cracks and their prevention. Tests with different alloy contents.

13495* (German.) The Change in the Conception of the Requirements To Be Met by Foundry Coke. **Die Wandlung der Anschauungen über die Anforderungen an Giessereikoks.** Christian Gapp. *Giesserei*, v. 44 June 6, 1957, p. 347-350.

Historical development of the requirements to be met by foundry coke, particularly as regards reactivity, degree of graphitization, and sulfur and ash contents. Characteristics of high-carbon coke.

13496* (German.) Possibilities of Active Dephosphorization or Denitrification of Cast Iron During Refining Into Nodular Iron. **Möglichkeiten der aktiven Entphosphorung bzw. Denitrierung von Gusseisen bei der Veredelung auf Kugelgraphit.** Josef Czikel. *Giessereitechnik*, v. 3, Mar. 1957, p. 52-54.

Literature survey of use of Mg, Ca, and Ce in manufacture of ductile iron.

13497* (German.) Experiment With Water-Glass Containing Molding Sand for Gray and Cast Steels Without CO_2 Hardening. **Das Arbeiten mit wasserglashaltigen Formsanden ohne Kohlensäurehärtung für Grau-und Stahlguss.** Alfred Gebauer and Otto Gerstmann. *Giessereitechnik*, v. 3, Apr. 1957, p. 73-77.

Preparation and properties of molding sands with water-glass as binder.

13498 Rotary Hearth Furnaces Geared for Automation in Shell Production Line. Arthur Q. Smith. *Industrial Heating*, v. 24 June 1957, p. 1128 + 8 pages.

Equipment and sequence of operations.

13499* (Russian.) Effect of Coke Properties on the Process of Smelting Cast Iron in a Cupola. **Vliianie sroistv koksa na protsess plavki chuguna v vagranke.** A. N. Strukov. *Liteinoe Proizvodstvo*, no. 5, May 1957, p. 17-20.

Describes experiments for increasing the production of a cupola by using various types of coke. Specific properties of coke are very important. Standard coke is unsatisfactory for obtaining the most effective performance. Properties of foundry coke depend on selection of the charge and on the technology of coking.

13500 Control of Casting Quality. R. King. *Metal Industry*, v. 90, June 14, 1957, p. 501-502.

A statistical approach to the influence of control of quality on costs in the production of brass billets.

13501* Making Quality Brass and Bronze Castings. *Modern Castings*, v. 32, July 1957, p. 31-40.

Defects due to melting, pouring, and solidification. Case histories showing five principal causes of defects due to poor design of gating and risering.

13502* How We Converted to Water-Cooled Cupolas. James McConville and Andrew Fischels. *Modern Castings*, v. 32, July 1957, p. 41-44.

Conversion resulted in faster, cheaper, and better-controlled melting of iron.

13503* X-Rays Speed Chemical Analysis. R. D. Ahles. *Modern Castings*, v. 32, July 1957, p. 45-46.

Advantages of X-ray emission spectrometry as a foundry tool include 80% reduction in time for analysis, lower cost, and non-destructive analysis.

13504* Die Casting Aluminum and Zinc. I. *Modern Metals*, v. 13, June 1957, p. 72 + 9 pages.

Growth of the die casting industry. Design and construction of dies and other equipment.

13505 Castings as Strong as Forgings. Conrad A. Parlanti. *Product Engineering*, v. 28, June 1957, p. 170-174.

New type of mold construction using anodized Al combined with controlled pouring rate is adaptable to large or small castings in Al, Mg, cast iron, and steel.

13506* (Czech.) Calculation of Time Between Casting and Taking Out of Castings From Permanent Molds. **Výpočet doby mezi odlitím a vyhozením odlitků z kovových forem.** Josef Vaculik. *Slévárenství*, v. 5, May 1957, p. 135-136.

13507* Improvement in the Mechanical Properties of Bronze Castings by Nitrogen Degasification. P. K. Chakravarty and S. Visvanathan. *TISCO*, v. 4, Apr. 1957, p. 89-94.

Gas unsoundness of bronze castings; degassing methods. Experimental technique employed for scavenging with inert nitrogen.

13508* (Polish.) Production of Cast Iron in Rotary Furnaces. **Wytwarzanie surówki w piecach obrotowych.** Maria Widera. *Wiadomości Hutnicze*, v. 13, Mar. 1957, p. 66-68.

See also: **13375** (cast metals handbook); **13389** (steels for diecasting dies); **13585** (strength of ductile iron).

METALS—HEAT TREATMENT

13509* Magnesium Alloy Castings: Heat Treatment After Welding Repairs. K. Kornfeld. *Canadian Metalworking*, v. 20, May 1957, p. 54 + 6 pages.

Test samples of unwelded AZ91 castings are compared with test pieces having approximately 20% of their cross-sectional areas occupied by an inert gas-welded deposit of identical composition.

13510 Quench and Temper Process for the Manufacture of High Strength Tubular Products. H. B. Emerick. *Blast Furnace and Steel Plant*, v. 45, June 1957, p. 608-613.

Points out trends toward deeper drilling for oil and gas. Describes new heat treating process for production of high-strength tubes and pipe used in well-drilling equipment. (To be continued.)

13511 Elimination of Brittleness From Hot-Rolled Transformer Sheet. V. A. Koroleva and M. I. Sherstyuk. *Henry Brutcher Translation No.* 3848, 8 p. (From *Stal'*, v. 16, no. 6, 1956, p. 545-548.) Henry Brutcher, Altadena, Calif.

Previously abstracted from original. See item 14759, v. 5, Nov. 1956.

13512* (German.) Carbonization Effect of Various Carburizing Agents. **Die Kohlungswirkung der verschiedenen Kohlungsmittel.** Karl Heinz Kopietz. *Härterei-Technische Mitteilungen*, v. 10, no. 1, 1956, p. 9-37.

Effect of time, temperature, and other carburizing variables on carbide formation in iron and steel.

13513* (German.) Selection of Material and Heat Treatment for Gear Wheels of Gear Trains. **Werkstoffwahl und Wärmebehandlung bei Zahnrädern für Bahngetriebe.** Heinrich Staudinger. *Härterei-Technische Mitteilungen*, v. 10, no. 3, 1957, p. 21-37.

Use of inductive hardening gives good results and in some cases eliminates the need for machining.

13514 Metallurgical Aspects of Induction Heating. Harry B. Osborn, Jr. *Industrial Heating*, v. 24, June 1957, p. 1102 + 8 pages.

Control of important variables. An explanation for the influence of prior structure of steel on depth of hardness, and the relationship of structure to power density and frequency. (To be continued.)

13515 New Furnaces Treat Giant Forgings and Extrusions. R. R. LaPelle. *Iron Age*, v. 180, July 11, 1957, p. 106-107.

Unitized construction means higher strength per weight ratio.

13516 Continuous Normalizing and Heat Treating Equipment for Steel Plate. Horace Drever and N. K. Willis. *Iron and Steel Engineer*, v. 34, June 1957, p. 125-130.

13517 Recent Heat Treatment Furnace Installations. Annual Survey for Developments. *Metallurgia*, v. 55, June 1957, p. 275 + 18 pages.

An illustrated survey of British installations.

13518 Steam Atmosphere Heat Treating Boosts Plant Operating Efficiency. F. L. Spangler. *Metal Treating*, v. 8, May-June 1957, p. 6-8.

In specially designed furnaces both ferrous and non-ferrous parts receive scale-free heat-treatment at temperatures up to 1250 F. Advantages include superior wear resistance, longer life, better machinability, and greater corrosion resistance.

13519* Some Thoughts on Spring Heat-Treatment and Finishing. E. Mitchell. *Wire Industry*, v. 24, June 1957, p. 561 + 4 pages.

Hardening and tempering; austempering; effects of good and bad heat-treatment; furnaces; atmospheres; barrelling and blueing; other finishes.

See also: **13628** (electrospark hardening).

METALS—MECHANICAL AND PHYSICAL PROPERTIES

13520 (English.) **The Electrical and Thermal Conductivities of Some Brasses at Low Temperatures.** W. R. G. Kemp, P. G. Klemens, R. J. Tainsh, and G. K. White. *Acta Metallurgica*, v. 5, June 1957, p. 303-309.

Below about 10 K, lattice conductivity is limited by the scattering of phonons by conduction electrons and by dislocations, while point imperfections are important at higher temperatures. Lattice conductivity at all temperatures is markedly increased by annealing.

13521 (English.) **Multiple Slip in Bicrystal Deformation.** J. D. Livingston and B. Chalmers. *Acta Metallurgica*, v. 5, June 1957, p. 322-327.

Macroscopic continuity at the boundary will in general require the crystals of a bicrystal to deform on at least four slip systems between them, distributed either with two in each crystal or with three in one crystal and one in the other. A model employing the pile-up of dislocations at a grain boundary led to a method of predicting which additional slip systems will operate in a given bicrystal.

13522* (Russian.) Effect of the Degree of Tensile Strain and of the Recrystallization Annealing Temperature on the Fatigue Limit of 12XH3A Steel. **Vliianie stepeni deformatsii pri rastiazhenii i temperatury rekristallizatsionnogo otzhiga na predel vynoslivosti stali 12XH3A.** I. P. Petrenko. *Akademiia Nauk Ukrains'koi RSR, Dopovidi*, no. 2, 1957, p. 134-137.

13523* (Italian.) Effect of Cold Work After Quenching on the Precipitation-Hardening and Age-Hardening Properties of Al-Cu-Mg Alloys. **Effetto dell'inerudimento dopo tempra di soluzione sulle caratteristiche d'invecchiamento naturale e artificiale delle leghe Al-Cu-Mg.** D. Gualandi and M. Leoni. *Alluminio*, v. 5, 1957, p. 203-211.

Cold working increases tensile strength and yield strength, and reduces elongation. More than 10% cold working may cause excessive reduction in elongation.

13524* (German.) Influence of Sub-Zero Temperatures and Notches on Static Strengths of Welded Aluminum Alloy Sheet. **Einfluss von tiefen Temperaturen und Kerbstellen auf die statischen Festigkeitswerte geschweisster Bleche aus Aluminiumlegierungen.** F. Erdmann-Jesnitzer. *Aluminium*, v. 33, June 1957, p. 376-384.

13525 A Hot-Hardness Survey of the Zirconium-Uranium System. W. Chubb, G .T. Muehlenkamp, and A. D. Schwope. *American Society for Metals, Transactions*, v. 50, *Preprint No.* 2, 1957, 10 p. (TS300 Am35t Vis.)

A complete hardness survey of the Zr-U system was made at temperatures from room temperature to 900 C. At 700 C an unusually hard phase was indicated in the alloys containing 95 to 100 at. % U.

13526 Apparatus for Determining the Hardness of Metals at Temperatures up to 3000 F. M. Semchyshen and C. S. Torgerson. *American Society for Metals, Transactions*, v. 50, *Prepint No.* 12, 1957, 9 p. (TS300 Am35t Vis.)

Hardness determinations using a synthetic sapphire are carried out in a purified argon atmosphere which protects the test specimen and heating element from oxidation.

13527 The Thermal Conductivity of Uranium. Karl F. Smith. *Argonne National Laboratory (U. S. Atomic Energy Commission)*, ANL-5700, pt. A, Apr. 1957, 34 p. (UF767 Un3.1an Contin.)

Summarizes data obtained from a search of pertient literature.

13528 The Electrical Conductivity of Uranium. Karl F. Smith. *Argonne National Laboratory (U. S. Atomic Energy Commission)*, ANL-5700, pt. B, Apr. 1957, 25 p. (UF767 Un3.1an Contin.)

A critical review of published data, including British work on purity, a study of transition temperature effects, and the effects of annealing temperature, cycling growth, preferred orientation, and hydrostatic pressure.

13529* Fatigue Testing of Butt Welds. J. H. Lavery, W. A. Mapp, and W. S. Coates. *Australasian Engineer*, v. 49, May 1957, p. 66-68.

Some test results.

13530 Porosity in Formed Titanium. R. A. Wood, D. N. Williams, H. R. Ogden, and R. I. Jaffee. *Battelle Memorial Institute, Titanium Metallurgical Laboratory Report No. 72*, May 1957, 36 p. (TN799.T5 B32.7t Vis.)

Development of porosity is a normal part of the deformation process in ductile materials. Deformation temperature, amount of strain, strain rate, state of stress, and amount and kind of impurity can affect the degree of porosity.

13531 Effect of Radiation on the Thermal Conductivity of Uranium-1.6 w/o Zirconium. H. W. Deem, M. Pobereskin, E. C. Lusk, C. F. Lucks, and G. D. Calkins. *Battelle Memorial Institute (U. S. Atomic Energy Commission)*, BMI-986, Mar. 1955, 19 p. (UF767 U3b Contin.)

Reduction in thermal conductivity for 0.21 and 0.75 a/o burnup was 8.0 and 9.5% respectively.

13532 On the Nature of Temper Brittleness in Pearlitic Steels. V. I. Prosvirin and E. I. Kvashnina. *Henry Brutcher Translation No.* 3732, 26 p. (From *Metallovedenie i Obrabotka Metallov*, v. 2, no. 2, 1956, p. 34-49.) Henry Brutcher, Altadena, Calif.

Previously abstracted from original. See item 8136, v. 5, July 1956.

13533 Measurement of Residual Stresses in Railroad Car Wheels. H. Bühler. *Henry Brutcher Translation No.* 3859, 15 p. (From *Eisenbahntechnische Rundschau*, v. 5, no. 7, 1956, p. 281-288.) Henry Brutcher, Altadena, Calif.

Composition, mechanical properties, and surface roughness of wheels. Lack of correlation between elasticity theory and variations in stress state of wheels.

13534 A Special Type of Ingot Cracks Resulting From Certain Impurities in Steel. P. Björnson and N. Nathorst. *Henry Brutcher Translation No.* 3880, 4 p. (Abstract translation from *Jernkontorets Annaler*, v. 139, 1955, p. 422-438.) Henry Brutcher, Altadena, Calif.

Previously abstracted from original. See item 12945, v. 4, Oct. 1955.

13535 Fatigue Strength of Steel Plates With Welded-On Inserts. I. V. Kudryavtsev and N. A. Balabanov. *Henry Brutcher Translation No.* 3894, 10 p. (From *Svarochnoe Proizvodstvo*, no. 6, June 1956, p. 1-5.) Henry Brutcher, Altadena, Calif.

Previously abstracted from original. See item 11372, v. 5, Sept. 1956.

13536 Composition vs. Hot Strength Diagram of the Alloys in the Nickel-Chromium-Titanium System. I. I. Kornilov and L. I. Pryakhina. *Henry Brutcher Translation No.* 3912, 12 p. (From *Izvestiia Akademii Nauk SSSR, OTN*, no. 7, July 1956, p. 103-110.) Henry Brutcher, Altadena, Calif.

Correlation of creep testing times in the region of saturated and supersaturated solutions and those of alloys corresponding to more dilute solutions and two-phase in structure.

13537 Method of Recording True Stress-Strain Diagrams at Elevated Temperatures. V. V. Merekina. *Henry Brutcher Translation No.* 3915, 3 p. (From *Zavodskaia Laboratoriia*, v. 22, no. 12, 1956, p. 1491-1492.) Henry Brutcher, Altadena, Calif.

Example of a true stress-strain diagram recorded on a ductile alloy at 68 and 390 F.

13538 The Effect of Pressure on the Electrical Resistance of Rubidium. J. S. Dugdale and J. A. Hulbert. *Canadian Journal of Physics*, v. 35, June 1957, p. 720-729.

By using He in both the solid and the fluid state as a pressure-transmitting medium, it was possible to measure the resistance of Rb from 2 K to room temperature at pressures up to 2500 atm.

13539 The Physical and Chemical Properties of Chromium. Murray C. Udy. Paper from "Chromium. v. II. Metallurgy of Chromium and Its Alloys". 1956. p. 101-147. Reinhold Publishing Corp. (QD181.C7 Ud9c)

Chemical properties, phase diagrams, and selected values of known physical constants of chromium and its compounds of a metallic nature are reported.

13540 Hydrogen Absorption, Embrittlement and Fracture of Steel. Arnold E. Schuetz and W. D. Robertson. *Corrosion*, v. 13, July 1957, p. 437t-458t.

Basic cause of failure is absorption of H. Principal factors in service failure are internal stress, magnitude of applied stress, and H content. Both martensitic and ferritic structures fail when the stress level and H content are sufficiently high.

13541* (Russian.) The Nature of Slip Bands Visible in the Microscope. **K voprosu o prirode vidimykh v mikroskop linii sdviga.** A. A. Bochvar and Iu. A. Preobrazhenskaia. *Doklady Akademii Nauk SSSR*, v. 113, no. 3, Mar. 21, 1957, p. 564-566 + 1 plate.

13542 Effect of Residual Elements on the Properties of Metals. Earl R. Parker, F. N. Rhines, James W. Halley, J. H. Scaff, and D. J. McPherson. 217 p. 1957. American Society for Metals, Cleveland. (TA460 Am35ef)

A series of five lectures dealing with the effects of lattice imperfections, solute atoms, the presence of a second phase, and residual and trace elements in non-ferrous alloys, steels, newer metals, and semiconductors.

13543* (Russian.) Instrument for Investigation of Magnetic Anisotropy. **Pribor dlia issledovaniia magnitnoi anizotropii.** B. B. Timofeev. *Elektrichestvo*, no. 5, May 1957, p. 72-74.

Description of device for nondestructive measurements in ferromagnetic polycrystalline metals and alloys.

13544* Fatigue Strength of Specimens Containing Preformed Fatigue Cracks. N. E. Frost. *Engineer*, v. 203, June 7, 1957, p. 864-867.

The fatigue limits of pre-cracked cylindrical specimens obtained under a repeated tension loading cycle with a minimum tensile stress of one ton per sq. in. are: mild steel, 1 to 12 tons per sq. in.; Ni-Cr steel, 1 to 15 tons per sq. in.; Al alloy 1 to 5.5 tons per sq. in.

13545 Fatigue Durability of Carburized Steel. J. B. Bidwell, et al. 123 p. 1957. American Society for Metals, Cleveland. (TA473 Am35f)

The influence of processing upon the metallurgical properties, residual stress distribution, and fatigue properties of carburized steel are evaluated experimentally.

13546* (French.) A Contribution to the Study of the Mechanical Properties of Unalloyed Gray Cast Iron Containing Lamellar Graphite. **Contribution a l'étude des caractéristiques mécaniques des fontes grises non alliées a griphite lamellaire.** M. Michel Ferry. *Fonderie*, no. 136, May 1957, p. 209-224.

Effects of structure, chemical composition, thickness of the parts, treatment in the ladle, and casting temperature on mechanical properties. Relationship between the various properties and optimum applications.

13547 The Damping Behaviour of Quenched Aluminum-Copper-Magnesium-Silicon Alloys. K. M. Entwistle. *Institute of Metals, Journal*, v. 85, June 1957, p. 425-430.

A transient damping maximum occurs in supersaturated single-phase solid solutions. The progressive increase of the damping effect with degree of supersaturation can be used to determine the solid-solubility limits at the temperature of solution-treatment.

13548 Effects of Solid Environments on the Brittle Fracture of Zinc Single Crystals. L. C. Weiner and M. Gensamer. *Institute of Metals, Journal*, v. 85, June 1957, p. 441-448 + 1 plate.

The normal fracture stress of crystal oriented with $X_0 = 3°$, tested in tension at room temperature, is increased 43% upon applying a surface film of Cu, Au, ZnO, Sn, or Zn thicker than 500 A. Above this value the increase is independent of film thickness. The primary mode of deformation is twinning accompanied by parent basal slip both before and after twinning, as well as basal slip within the twins. The fracture stress of coated crystals oriented with $X_0 = 83°$ is 48% less than the value observed with clean-surfaced crystals.

13549* (Spanish.) Magnetic Properties and Temperature: Saturated Magnetization in the Study of Solid State Transformations and in Powder Metallurgy. **Las propiedades magneticas y la temperatura: la imanacion de saturacion en el estudio de las transformciones en estado solido y en la metallurgia de polvos.** Miguel P. De Andres Sanz. *Instituto del Hierro y del Acero*, v. 10, Jan.-Mar. 1957, p. 80-96.

A study of specific magnetization in steel and other ferrous materials. Applications to unalloyed carbon steels. Transformation or disappearance of magnetization as a function of temperature.

13550 Boron Solves "Hot Shortness" in Stainless Steels. D. L. Loveless and F. K. Bloom. *Iron Age*, v. 179, June 20, 1957, p. 95-97.

The hot-working performance of austenitic stainless steels increases markedly with small additions of B.

13551 How Defects Affect Tensile Strength of Light Alloy Castings. Herman Mansfield. *Iron Age*, v. 180, July 4, 1957, p. 75-77.

X-ray studies correlate quality of Al and Mg castings and their tensile strength.

13552 The Effect of Oil Quenching and Tempering on Thermal Conductivity and Electrical Resistivity. R. W. Powell and R. P. Tye. *Iron & Steel*, v. 30, June 8, 1957, p. 285-288.

Studies on three alloy steels.

13553 Effect of Alloying Elements on Tensile Strength. J. Glen. *Iron & Steel*, v. 30, June 8, 1957, p. 295 + 21 pages.

Effects of Mn, Cr, Mo, W, V, Ti, Si, Ni, and Cu on high-temperature tensile properties of low-carbon steel in the normalized condition.

13554 Surface Tension of Pure Liquid Iron, Cobalt, and Nickel at 1550°C. Paul Kozakevitch and Georges Urbain. *Iron and Steel Institute, Journal*, v. 186, June 1957, p. 167-173.

The capillary constant a^2 of Fe was found to be 26.0 sq. mm. and the surface tension (density 7.2) $\gamma = 1835$ dynes per cm. For Co $a^2 = 25.3$ sq. mm. and $\gamma = 1936$ dynes per cm. (density 7.8). For Ni $a^2 = 25.8$ sq. mm. and $\gamma = 1924$ dynes per cm. (density 7.6).

13555 Correlation of Tensile Properties With Microstructure for Some 3% Nickel Steels. J. P. Hugo and J. H. Woodhead. *Iron and Steel Institute, Journal*, v. 186, June 1957, p. 174-188.

Interlamellar spacing of pearlite formed isothermally is inversely proportional to the degree of undercooling. Strength properties of pearlitic steels are linearly dependent on the reciprocal of the square root of the interlamellar spacing when allowance is made for the effect of pro-eutectoid ferrite, and also may be related linearly to the logarithm of the interlamellar spacing. No simple relationship appears to exist for the strength properties of bainitic steels nor for the ductility results for the steels in either pearlitic or bainitic states.

13556 The Effect of Cold Work on the Creep-Rupture Properties of a Series of Simple 18-8 Stainless Steels. Frank B. Cuff and Nicholas J. Grant. *Iron and Steel Institute, Journal*, v. 186, June 1957, p. 188-197.

Studies of six simple steels at 1100 and 1200 F and at four levels of cold work revealed a relationship among the composition M_s temperature, recrystallization temperature, and rupture life.

13557* (Russian.) New Pneumatic, High-Speed Ram Impact Machine. **Novyi pnevmaticheskii skorostnoi koper.** A. A. Il'iushin and P. M. Ogibalov. *Izvestiia Akademii Nauk SSSR, Otdelenie Tekhnicheskikh Nauk*, no. 3, Mar. 1957, p. 57-65.

This impact testing machine, developed in 1955, with rated impact velocity up to 300/sec. and impact energy above 3.5×10^4 kg-m, is described in detail and illustrated both schematically and by photographs.

13558 Structural Materials for Missile Applications at Very High Temperatures. J. R. Kattus. *Jet Propulsion*, v. 27, June 1957, p. 644-649.

Short-time mechanical properties of Cu, Fe, Mo, Ta, and graphite were determined at temperatures up to the melting points of the metals and up to 5200 F for the graphite.

13559 Effect of Stress on Creep at High Temperatures. H. Laks, C. D. Wiseman, O. D. Sherby, and J. E. Dorn. *Journal of Applied Mechanics*, v. 24, June 1957, p. 207-213.

According to a preliminary dislocation-climb model for high-temperature creep, the activation energy for creep is that for self-diffusion, the effect of stress on the creep rate depends on the number of active Frank-Read sources, and the rate of climb depends on the structure as determined by the pattern of climbing dislocations.

13560 Low-Temperature Reactor Irradiation Effects in Metals. T. H. Blewitt, R. R. Coltman, C. E. Klabunde, and T. S. Noggle. *Journal of Applied Physics*, v. 28, June 1957, p. 639-644.

The annealing kinetics of low-temperature reactor irradiated Cu and Al in the region from 30 to 50 K are of the first order without a unique activation energy.

13561 Low-Temperature Deformation of Copper Single Crystals. T. H. Blewitt, R. R. Coltman, and J. K. Redman. *Journal of Applied Physics*, v. 28, June 1957, p. 651-660.

Deformation at 4.2 K proceeds by three different mechanisms: at low flow stresses ordinary glide occurs; at intermediate flow stresses, a discontinuous slip occurs; at high flow stresses for certain ample orientations, twinning takes place. Twinning, but not discontinuous slip, was observed at 77.3 K.

13562 Magnetostriction of Aluminum-Iron Single Crystals in the Region of 6 to 30 Atomic Percent Aluminum. R. C. Hall. *Journal of Applied Physics*, v. 28, June 1957, p. 707-713.

13563 Internal Friction in the Presence of a Static Stress. George S. Baker. *Journal of Applied Physics*, v. 28, June 1957, p. 734-737.

The low strain amplitude damping of Cu and Pb was found to be essentially unaffected by the presence of the static stress. Aluminum differs from Pb and Cu in that at room temperature, damping is independent of amplitude at low strain amplitudes.

13564* Low Temperature Brittleness. A. W. Magnusson and W. M. Baldwin, Jr. *Journal of the Mechanics and Physics of Solids*, v. 5, no. 3, 1957, p. 172-181.

Tungsten, Cd, Sn, Mo, Fe, and Cr become brittle at low temperatures and high strain rates. When the reciprocal of the absolute temperature for full brittleness is plotted vs. log strain rate, or log time to fracture, straight lines are obtained. Mercury, V, Ta, Zr, and Ti (all non-face-centered cubic metals) are ductile down to liquid air temperatures and at strain rates equal to 19,000 in./in./min.

13565* Fatigue Tests on Notched Mild Steel Plates With Measurements of Fatigue Cracks. N. E. Frost and D. S. Dugdale. *Journal of the Mechanics and Physics of Solids*, v. 5, no. 3, 1957, p. 182-192 + 1 plate.

Circumstances for obtaining no cracks, non-propagating cracks, and complete failure were determined in terms of root radius, mean stress, and stress range.

13566 Creep Rates of Excentrically Loaded Test Pieces. Åke Isaksson. *Kungl. Tekniska Högskolans Handlingar (Transactions of the Royal Institute of Technology, Stockholm, Sweden)*, no. 110, 1957, 33 p. (T4 K96t Vis.)

The influence of load eccentricities on the secondary creep rate for bars of different sections.

13567 How to Distinguish Brittle From Tough Steel. Herman Greenberg. *Metal Progress*, v. 71, June 1957, p. 75-81.

To insure freedom from brittle failure in service, steel should have a "nil-ductility transition (NDT) temperature" below its minimum working temperature. At temperatures below NDT, samples with a sharp notch break with all-cleavage fracture.

13568 Hardness and Its Measurement. Vincent E. Lysaght. *Metal Treating*, v. 8, May-June 1957, p. 2 + 12 pages.

Significance of hardness testing; instruments and techniques; testing hardness of tempered steel, case-hardened steel, cast iron, and nitrided and thin case-hardened surfaces.

13569* Influence of Lattice Defects on the Electrical Properties of Cold-Worked Metals. II. H. G. van Bueren. *Philips Research Reports*, v. 12, June 1957, p. 190-239.

Plastic deformation of metals; electrical resistivity and magnetoresistivity of plastically strained metals; recovery of resistivity and magnetoresistivity caused by plastic deformation.

13570 The Thermal and Electrical Conductivity of Chromium at Low Temperatures. A. F. A. Harper, W. R. G. Kemp, P. G. Klemens, R. J. Tainsh, and G. K. White. *Philosophical Magazine*, v. 2, ser. 8, May 1957, p. 577-583.

13571 On the Activation Energy of High Temperature Creep in Metals. Paul Feltham. *Philosophical Magazine*, v. 2, ser. 8, May 1957, p. 584-588.

13572 Dislocation Locking and Fracture in α-Iron. J. Heslop and N. J. Petch. *Philosophical Magazine*, v. 2, ser. 8, May 1957, p. 649-658.

Inhibition of plastic deformation by dislocation locking promotes brittleness. Ductility conferred by Mg in the Fe is associated with weakened dislocation locking as well as with grain refinement. The weakening of the locking appears to be due to interaction between N and Mn atoms.

13573 The Magnetization of Cobalt-Manganese and Cobalt-Chromium Alloys. J. Crangle. *Philosophical Magazine*, v. 2, ser. 8, May 1957, p. 659-668.

Magnetic moments of both hexagonal and face-centered cubic phases in several ferromagnetic Co-rich alloys at absolute zero were estimated.

13574 The Anhysteretic Magnetization of Permanent Magnet Alloys. E. P. Wohlfarth. *Philosophical Magazine*, v. 2, ser. 8, June 1957, p. 719-725.

Calculations show that the single domain treatment gives an adequate account of anhysteretic magnetization.

13575 Magnetic Properties of Cu-Mn Alloys. Kei Yosida. *Physical Review*, v. 106, ser. 2, June 1, 1957, p. 893-898.

13576 Thermal Conductivities of Pure Metals at Low Temperatures: Mercury. R. T. Webber and D. A. Spohr. *Physical Review*, v. 106, ser. 2, June 1, 1957, p. 927-933.

In the normal state, the thermal conductivity is a very strong function of temperature, and at temperatures below about 3 K, is strongly dependent on the applied magnetic field.

13577* The Magnetic Susceptibilities of Lanthanum, Cerium, Praseodymium, Neodymium and Samarium, From 1-5 K to 300 K. J. M. Lock. *Physical Society, Proceedings*, v. 70, no. 450B, June 1, 1957, p. 566-576.

13578* The Effect of Thin Films of Gold on the Mechanical Properties of Cadmium Single Crystals. F. R. Lipsett and R. King. *Physical Society, Proceedings*, v. 70, no. 450B, June 1, 1957, p. 608-620.

Thin Au films increased the stress at which plastic deformation started by about 6 g. wt. per sq. mm. The increase was independent of film thickness for films of 1500 to 24000 A. The nature of the effect on stress-strain curves depends upon crystal orientation.

13579 Electron-Spin Resonance and Magnetic-Susceptibility Measurements on Dilute Alloys of Mn in Cu, Ag and Mg. J. Owen, M. E. Browne, V. Arp, and A. F. Kip. *Physics and Chemistry of Solids*, v. 2, Apr. 1957, p. 85-99.

Some measurements in the temperature range 2 to 400 K.

13580 Thermal Stress Fatigue. L. F. Coffin, Jr. *Product Engineering*, v. 28, June 1957, p. 175-179.

Where thermal stresses originate; how thermal stress fatigue differs from mechanical fatigue; what design criteria to use.

13581* (French.) Influence of Various Additions to a 70-30 Brass on Mechanical Properties at High Temperature. **Influence de diverses additions sur la tenue du laiton 70-30 aux contraintes mécaniques à chaud.** J. Herenguel and M. Le Nouaille. *Revue de Métallurgie*, v. 54, May 1957, p. 354-368.

Effects of P, Cd, Sn, C, Cr, Ni, Be, Si, Al, Ag, Mn, Mg, Pb, Se, Te, Bi, Sb, and As.

13582 The Mechanical Behaviour of Single Crystals of Metals, in Particular Copper. E. N. da C. Andrade and D. A. Aboav. *Royal Society, Proceedings*, v. 240, ser. A, June 11, 1957, p. 304-320 + 2 plates.

Variation of the amount of easy glide with the orientation of the crystal axes relative to the direction of tension was measured. At −180 C this can be quantitatively expressed by a specific hardening on the active glide planes, which does not exist for the latent glide planes, and a general hardening which applies to both active and latent glide planes. Specific hardening and critical shear stress are little affected by temperature.

13583 The Specific Heat of Metals and Alloys at Low Temperatures. H. Jones. *Royal Society, Proceedings*, v. 240, ser. A, June 11, 1957, p. 321-332.

In metals in which the Fermi surface lies close to the Brillouin-zone boundaries, electron-lattice interaction leads to an additional term in the specific heat, linear in the temperature in the liquid-helium range, which, therefore, augments the pure electronic specific heat. Variation of this term in the α-brasses is considered.

13584* (Russian.) Properties of the 45 Steel With Boron. **Svoistva stali 45 s borom.** Ia. E. Gol'dshtein, L. S. Liakhovich, L. L. Piatakova, and G. M. Trusenev. *Stal'*, v. 17, May 1957, p. 449-452.

Addition of 0.002 to 0.006% of B to the "45" steel increases hardenability and consequently improves some of its properties.

13585 More Hot Strength for Ductile Iron. *Steel*, v. 141, July 8, 1957, p. 96.

Shows creep strength of ductile iron compared with steel. Strength is influenced considerably by alloy additions.

13586 Tool Steels. II. Why Do Tool Steels Fail? L. F. Spencer. *Steel Processing and Conversion*, v. 43, June 1957, p. 315 + 9 pages.

An investigation of failures caused by design, poor quality steel, heat treatment, and operational procedures.

13587* (Russian.) Electrical Conductivity of Aluminum. **Elektroprovodnost' aliuminiia.** A. P. Beliaev and R. M. Gol'shtein. *Tsvetnye Metally*, v. 30, May 1957, p. 74-78.

Data on the electrical properties of commercial Al (AB000, A00, A0, A1, and A2) are compiled and the effects of impurities are analyzed.

13588 Plastic Deformation of Aluminum Single Crystals at Elevated Temperatures. R. D. Johnson, A. P. Young, and A. D. Schwope. *U. S. National Advisory Committee for Aeronautics, Report* 1267, 1956, 31 p. (TL521 Un3r Vis.)

X-ray and electron microscopy techniques and tensile tests were used to study plastic properties over a wide range of temperatures up to and including 1100 F.

13589* (Russian.) Development of the Theory of Fatigue of Metals. **Razvitie teorii ustalosti metalov.** I. A. Oding. *Vestnik Akademii Nauk SSSR*, v. 27, Apr. 1957, p. 24-30.

Historical survey of the theory of metal fatigue. Importance of the theory in present day industry.

13590* (Russian.) Some Problems of the Electronic Theory of Metals. **Nekotorye problemy elektronnoi teorii metallov.** I. M. Lifshits. *Vestnik Akademii Nauk SSSR*, v. 27, Apr. 1957, p. 46-53.

Importance of the electronic theory in study of mechanical, electrical, optical, magnetic, and other properties.

13591* The Problem of Brittle Fracture. IV. W. D. Biggs. *Welder*, v. 26, Jan.-Mar. 1957, p. 2-7.

The responsibility for the brittle failure of a structure can seldom, if ever, be assigned to one group of causes. In most cases, material, design, and workmanship have been equally at fault.

13592 Fatigue Resistance of Simulated Nozzles in Model Pressure Vessels. Georges Welter and Julien Dubuc. *Welding Journal*, v. 36, June 1957, p. 271s-274s.

All fractures occurred in the longitudinal direction of the pressure vessels and began at points of maximum circumferential stress concentration at the edge where the nozzle hole meets with the internal surface of the pressure vessel shell.

13593 Effect of Prior Anneal Temperature on 18/8 Wires. Samuel Storchheim. *Wire and Wire Products*, v. 32, June 1957, p. 641 + 5 pages.

Effect of deformation and annealing treatment on magnetic properties.

13594* (Russian.) Possible Simplification of Sample Shape for Fatigue Testing of Metals. **Vozmozhnye uproshcheniia formy obraztsov dlia ispytaniia metallov na ustalost'.** I. V. Kudriavtsev. *Zavodskaia Laboratoriia*, v. 23, Apr. 1957, p. 461-468.

Several examples of fatigue testing of metals are described, using round samples on Shenk and UIPM-20 machines and flat samples on resonance machines. Shows the possibility of significant simplification of shape of steel samples by surface cold working the sections gripped in the clamps. The use of cold working makes the thickening of the grip ends unnecessary and permits fatigue investigation of samples with uniform cross-sections. Cold working can be achieved by rolling, shot peening, or coining.

13595* (Russian.) Investigation of Local Deformations During Plastic Bending in Relation to the Bending Test. **Issledovanie mestnykh deformatsii pri plasticheskom izgibe v sviazi s voprosom o probe na zagib.** *Zavodskaia Laboratoriia*, v. 23, Apr. 1957, p. 469-476.

Studies on samples of various types of steel. Effect of size of specimen.

13596* (Russian.) Possibility of Determining the Conditions of Breakage According to the Appearance of Fracture Shape. **O vozomozhnosti opredeleniia uslovii razrusheniia povidu izloma.** P. G. Abramov, N. A. Bushe, and N. P. Shchapov. *Zavodskaia Laboratoriia*, v. 23, May 1957, p. 600-601 + 2 plates.

Gives examples of fatigue and impact fractures in Zn alloys at various temperatures.

13597* (German.) Alternating Deformation of Aluminum Single Crystals. **Wechselverformung von Aluminium-Einkristallen.** Herbert Scholl. *Zeitschrift für Metallkunde*, v. 48, May 1957, p. 258-262.

Stress strain curve was determined at room temperature in an apparatus with alternating shear at constant rate of deformation and strain amplitude.

13598* (German.) The Electrical Resistance of Molten Metals. **Der elektrische widerstand von metallischen Schmelzen. I.** Methods of Measurement and Electrical Resistance of Molten Pure Metals. **Messmethode und elektrischer Widerstand von geschmolzenen reinen Metallen.** Albert Roll and Hasso Motz. *Zeitschrift für Metallkunde*, v. 48, May 1957, p. 272-280.

The electrical resistance and its temperature coefficient of 13 pure molten metals were measured up to 1200 C with an accuracy of 1%, employing a rotating field method without electrodes.

13599* (German.) Investigation of Kikuchi-Lines by Plastic Deformation of Aluminum Single Crystals. **Untersuchung von Kikuchi-Linien bei plastischer Verformung von Aluminium-Einkristallen.** James K. Roros. *Zeitschrift für Metallkunde*, v. 48, May 1957, p. 281-288.

See also: **13443** (toughness of high-purity Fe); **13626** (deformation of steel); **13649** (deformation of brass); **13653** (slips in Ni_3Mn); **13660** (deformation of steel); **13662** (slip in crystals); **13696** (strength of Al alloys); **13702** (radiation effects in Al and Mg); **13817** (physical properties at low temperatures); **13996** (ductility of Mo welds); **13997** (properties of Mo welds).

METALS—MECHANICAL WORKING

13600 Automatic Recording of Variables in Drawing of Metals. M. T. McGowan and R. M. Treco. *Bridgeport Brass Company (U. S. Atomic Energy Commission)*, BRB-35, Dec. 1956, 24 p. (UF767 Un3.1br Contin.)

Accurate evaluation of the relations of force with drawing stroke and velocity can be done simply and easily. Instrument is comprised of two recorders, enabling simultaneous recording of forces on the draw bar and plug rod during tube drawing.

13601 Effect of Surface-Active Lubricants Upon Drawing of Metal Wire. V. D. Chistota, S. Ya. Veiler, V. I. Likhtman, and P. A. Rebinder. *Henry Brutcher Translation No.* 3872, 6 p. (From *Doklady Akademii Nauk SSSR*, v. 110, no. 4, 1956, p. 562-565.) Henry Brutcher, Altadena, Calif.

Correlation between number of carbon atoms in the structural chain of lubricants, die pull, and temperature effect (20 to 60 C).

13602* (Spanish.) Analyzing the Textures of Rolled Aluminum. **Analisis de las texturas de laminacion del aluminio.** Jose Terraza Martorell and Juliana Arroyo Ruiperez. *Instituto del Hierro y del Acero*, v. 10, Jan.-Mar. 1957, p. 20-35.

A photometric study of rolled Al diffractograms by means of different microphotometers. Textures for various degrees of reduction. Variation of the polar figures.

13603 How to Make 17-7 PH Honeycomb Panels. P. M. Allen. *Iron Age*, v. 180, July 11, 1957, p. 99-101.

Lightweight, high-strength honeycomb panels of 17-7 PH stainless are now being turned out in routine production.

13604 Automatic Gage Control for Cold Reduction Mills. R. A. Phillips and H. S. Maxwell. *Iron and Steel Engineer*, v. 34, June 1957, p. 149-158.

An analysis of rolling mill operation to determine principles which govern design and use of automatic control equipment.

13605 Friction in Cold Rolling. C. T. van Rooyen and W. A. Backofen. *Iron and Steel Institute, Journal*, v. 186, June 1957, p. 235-244.

Both the radial-oblique pin and the surface reference-marker techniques are useful tools for exploring frictional conditions along the arc of contact. Experiments were performed on Al strip with roll surfaces prepared by grinding and also by sand blasting.

13606* Partial Sideways Extrusion From a Smooth Container. W. Johnson. *Journal of the Mechanics and Physics of Solids*, v. 5, no. 3, 1957, p. 193-201.

Effects of unusual locations of the die with respect to the direction of motion of the punch were examined.

13607 Titanium Deep Drawing Characteristics. *Light Metal Age*, v. 15, June 1957, p. 14-16.

Advantages of stamping over other fabrication processes for Ti are speed, low cost per unit, close tolerances, ease of shaping, and strength.

13608 Extrusion Press Tooling. II. Frank Sowa. *Light Metal Age*, v. 15, June 1957, p. 27 + 2 pages.

Liner manufacture; container assembly; the stem.

13609 Hydroforming. J. R. Zimmerman. *Machine Design*, v. 29, June 27, 1957, p. 86-88.

Formed parts of complex design can be produced in trial quantities, as well as production runs, and with simple inexpensive tooling, by hydroforming. Description of tools and forming procedures.

13610 Roller-Burnishing With Hegenscheidt Equipment. *Machinery (London)*, v. 91, June 21, 1957, p. 1385-1389.

Process consists of cold-rolling the surface of a workpiece by means of hardened and polished rollers, applied under pressure. The burnishing roller should be set at a slight angle to the axis with the result that three working zones are formed. Data on plunge-rolling of fillet radii and on copy-rolling for burnishing contours and tapers.

13611 Precision Control of Hydraulic Forging Presses. *Metal Treatment and Drop Forging*, v. 24, June 1957, p. 217-222.

Recent developments in hydraulic controls and drives in Great Britain.

13612* Titanium Extrusions. A. M. Sabroff and P. D. Frost. *Modern Metals*, v. 13, June 1957, p. 50 + 4 pages.

A summary of available information on extrusion of Ti and its alloys; probable demand and requirements and progress in meeting it; firms that have extruded Ti; extrusion practices; tooling; heat treating; mechanical properties of extrusions.

13613 Continuous Automatic Line Turns Out Seamless, Printed Aluminum Cans. *Products Finishing*, v. 21, July 1957, p. 37-41.

New process starts with a slug of Al and turns out an extruded Al can, lacquered and decorated.

13614 Ultrasonic Machining. II. Operating Conditions and Performance of Ultrasonic Drills. E. A. Neppiras and R. D. Foskett. *Philips Technical Review*, v. 18, no. 12, 1956/57, p. 368-379.

Cutting speeds, accuracy, and surface finish are considered.

13615 (German.) The Behavior of the Surface of Rolls During the Rolling Process. **Das Verhalten der Oberfläche von Walzen beim Walzvorgang.** Wilhelm Hesse. *Stahl und Eisen*, v. 77, May 30, 1957, p. 715-727.

Theoretical principles for the formation of fractures and surface defects on the rolls. Static and dynamic causes of the fractures. Stresses caused by temperature variations, by the method of fabrication used, and by mechanical strain during rolling. Examples of scaling and cracking of the surface with different methods of rolling and different qualities of rolls.

13616* (Russian.) Cold-Rolled Vanadium- or Aluminum-Containing Sheets for Deep Drawing. **Kholodnokatanye listy s vanadiem ili aliuminiem dlia glubokoi vytiazhki avtokuzovnykh detalei.** D. A. Litvinenko, A. A. Rastorguev and V. K. Barzy. *Stal'*, v. 17, May 1957, p. 445-449.

Low C rimmed steel with addition of 0.03 to 0.04% of V, or killed steel containing 0.07% of Al have stable high mechanical and drawing properties; at die pressing of various parts, lines of displacement are not formed.

13617 Rolls Forge Precision Parts. *Steel*, v. 141, July 8, 1957, p. 97-100.

Roll forging returns as a precision forming method.

13618 Guide to Carbide Tool Geometry. *Steel*, v. 141, July 8, 1957, p. 110-111.

Recommended cutting angles fo rseven types of metal are tabulated.

13619* (Czech.) Extending the Durability of High-Speed Drills and Cutting Tools. **Prodlužování trvanlivosti vrtáků a fréz z rychlořezných ocelí.** F. Drábek. *Strojírenská Výroba*, v. 5, May 1957, p. 196-200.

A survey of the effects of various methods of increasing tool durability.

13620* Impact and High-Velocity Forming—The Trend Toward Explosive Techniques. R. W. Peters. *Tool Engineer*, v. 39, July 1957, p. 83-86.

Advantages of high-velocity forming will be smaller production equipment, higher production rates, and increased ability to form large parts of high-strength materials.

13621* Production Drilling and Reaming of Precision Holes. Herbert Gregg. *Tooling and Production*, v. 23, July 1957, p. 71-74.

Holes can be speedily drilled from the solid with extreme accuracy and finish, and at lowered cost, using trepan-like drills and high pressure coolant fed through the tool.

13622* Choose With Care Your Press Drawing Lubricants. Leon Salz. *Tooling and Production*, v. 23, July 1957, p. 87-91.

The need for careful press drawing lubricant selection is emphasized.

13623* Methods and Procedures for Special Tube-Bending Applications. R. J. Reardon. *Western Machinery and Steel World*, v. 48, June 1957, p. 108-109.

13624* (Polish.) The Cold Rolling of Flat Wire. **Walcowanie na zimno drutu płaskiego.** Kajimierz Janas. *Wiadomości Hutnicze*, v. 13, Apr. 1957, p. 103-105.

Equipment and operating procedures.

See also: **13034** (rolling mill drives); **13035** (magnetic amplifiers for rolling mills); **13036** (electrospark machining); **13370** (manufacture of cutting tools); **13444** (flame cutting of steel); **13586** (tool steel failures); **13897** (extrusion of resin wire insulation).

METALS—METALLOGRAPHY, TRANSFORMATIONS, AND STRUCTURES

13625* (English.) **Investigations on σ-FeCrSi.** Bertil Aronsson and Torsten Lundström. *Acta Chemica Scandinavica*, v. 11, no. 2, 1957, p. 365-372.

The solubility of Si in σ-FeCr at 690 C and the lattice dimensions of the σ-phase as functions of the Si content were determined.

13626 (English.) **Effects of Plastic Deformation on Carbide Precipitation in Steel.** D. V. Wilson. *Acta Metallurgica*, v. 5, June 1957, p. 293-302.

In a sufficiently deformed medium-carbon martensite normal precipitation of the ε-carbide in the first stage of tempering can be suppressed and, on heating above 200 C, the precipitation of cementite is hindered. If a steel is first tempered to precipitate an iron carbide and then deformed, the precipitate will tend to redissolve in the cold-worked matrix.

13627 (English.) **Precipitation in Gold-Platinum Alloys.** T. J. Tiedema, J. Bouman, and W. G. Burgers. *Acta Metallurgica*, v. 5, June 1957, p. 310-321.

13628* (Russian.) The Phase Composition of the Surface of Some Metals After Being Treated by Electrosparks From Different Electrodes. **Fazovii sklad poverkhni deiakikh metaliv pislia elektroiskrovoi obrobki riznimi electrodami.** K. F. Starodubov and B. P. Kolesnik. *Akademiia Nauk Ukrains'koi RSR, Dopovidi*, no. 6, 1956, p. 539-543.

Investigation of the phase composition of the outer layer of different combinations of V, Mn, Zr, Cb, Al, Fe, Ni, Cu, Zn, Cd, Pb, and Bi after electrospark hardening treatment.

13629 Grain Growth and Recrystallization Studies on Commercial Titanium, RC-55, and Alloy, Ti-100 A. E. L. Bartholomew, Jr. *American Society for Metals, Transactions*, v. 50, *Preprint No.* 1, 1957, 19 p. (TS300 Am35t Vis.)

Influences of prior-to-deformation grain size, amount of cold deformation, annealing temperature, and time on the grain size of cold worked and annealed materials.

13630 Growth of Cadmium From the Vapor. J. E. McNutt and R. F. Mehl. *American Society for Metals, Transactions*, v. 50, Preprint No. 6, 1957, 38 p. (TS300 Am35t Vis.)

A technique for making continuous microscopic and interferometric observations of Cd crystals while they are actually growing by deposition shows new types of defects.

13631 Solubility of Carbon in Thorium. Robert Mickelson and David Peterson. *American Society for Metals, Transactions*, v. 50, *Preprint No.* 7, 1957, 14 p. (TS300 Am35t Vis.)

The limit of solubility is reported at room temperature, 800, 1018, and 1215 C.

13632 A Method for the Etching of Metals by Gas Ion Bombardment. J. B. Newkirk and W. G. Martin. *American Society for Metals, Transactions*, v. 50, *Preprint No.* 8, 1957, 13 p. (TS300 Am35t Vis.)

Krypton is used as the etching agent in a magnetic field in the ionization chamber.

13633 Ferromagnetic - Antiferromagnetic Phase Transitions. Thomas James Hendrickson and J. M. Keller. *Ames Laboratory (U. S. Atomic Energy Commission)*, ISC-729, Mar. 1956, 119 p. (UF767 Un3.1is Contin.)

The molecular field approximation was applied to the study of transitions in dysprosium metal. An anisotropy energy was introduced which arises from the effect of crystal fields.

13634* (English.) **The *K* X-Ray Absorption Edge of Aluminum in Metal and Oxide.** Lars Rudström. *Arkiv för Fysik*, v. 12, no. 3, 1957, p. 287-294.

13635* (Russian.) Effect of Niobium on the Structure of 18-8 Austenitic Steel Weld Seams. **Vliianie niobiia na strukturu svarnykh shvov austenitnoi stali tipa 18-8.** G. G. Mukhin and N. Iu. Pal'chuk. *Avtomaticheskaia Svarka*, v. 10, Mar.-Apr. 1957, p. 1-10.

Structure and mechanical properties in the initial state and after quenching, annealing, and 1000 hrs. heating at 650 C. A new phase was found.

13636* (Russian.) Metallurgical Characteristics of Welding Austenitic Acid-Resistant Steels Containing 23% Cr and 23 to 28% Ni. **Metallurgicheskie osobennosti svarki austenitnykh kislotostoikikh stalei s 23% khroma i 23-28% nikelia.** Iu. I. Kazennov and L. P. Kolosova. *Avtomaticheskaia Svarka*, v. 10, Mar.-Apr. 1957, p. 22-31.

Peculiarities of crystallization of pure austenite weld seams were studied. Relation between chemical composition of seams and formation of hot cracks.

13637 Classification of Stringers and Identification of Inclusions in Reactor-Grade Uranium. H. A. Saller. *Battelle Memorial Institute (U. S. Atomic Energy Commission)*, BMI-965, Nov. 1954, 21 p. (UF767 U3b Contin.)

13638 Electron Microscope and Diffraction Studies of 7% Chromium-Molybdenum Steels. Betty E. Williams. *British Journal of Applied Physics*, v. 8, June 1957, p. 241-247.

Notes presence of a fine precipitate of TiC.

13639 Autoradiographic Study of Microsegregation in Steel. I. E. Bolotov, M. I. Gol'dshtein, A. A. Popov, and A. B. Fedorov. *Henry Brutcher Translation No.* 3866, 9 p. (From *Zavodskaya Laboratoriya*, v. 22, no. 6, 1956, p. 682-688.) Henry Brutcher, Altadena, Calif.

Previously abstracted from original. See item 13268, v. 5, Oct. 1957.

13640 Etching Technique for Simultaneous Development of Austenite and Pearlite Structures. V. S. Popov. *Henry Brutcher Translation No.* 3891, 3 p. (From *Zavodskaya Laboratoriya*, v. 22, no. 3, 1956, p. 317.) *Henry Brutcher*, Altadena, Calif.

A new etching technique which perimts a simultaneous development of austenitic and pearlitic structures in composite welds.

13641 Investigation of Diffusion of Boron and Carbon Into Some Metals of Transition Groups. G. V. Samsonov and V. P. Latysheva. *Henry Brutcher Translation No.* 3902, 16 p. (From *Fizika Metallov i Metallovedenie*, v. 2, no. 2, 1956, p. 309-319.) Henry Brutcher, Altadena, Calif.

Previously abstracted from original. See item 13229, v. 5, Oct. 1956.

13642 Structure of Magnetite in Diffusional Reduction Layers on Grains of Hematite. V. I. Arkharov and V. N. Bogoslovskii. *Henry Brutcher Translation No.* 3913, 26 p. (From *Fizika Metallov i Metallovedenie*, v. 3, no. 2, 1956, p. 254-268.) Henry Brutcher, Altadena, Calif.

Previously abstracted from original. See item 2619, v. 6, Feb. 1957.

13643 How to Reveal the Microstructure of Non-Etching Surface Layers on Ferrous Metals. B. A. Krasyuk. *Henry Brutcher Translation No.* 3920, 6 p. (From *Zavodskaia Laboratoriia*, v. 22, no. 5, 1956, p. 556-558.) Henry Brutcher, Altadena, Calif.

A study of failure of known etchants to bring out the structure of surface layers of ferrous metal which have been subjected to surface treatment.

13644* (French.) Orientation Structures in Ferro-Nickel Alloys. **Surstructures d'orientation dans les alliages fer-nickel.** Eric Tapley Ferguson. *Comptes Rendus*, v. 244, May 6, 1957, p. 2363-2366.

The uniaxial anisotropy produced in ferronickel alloys by annealing in a magnetic field was determined as a function of the composition of the alloy and the temperature and duration of the annealing process.

13645* (French.) Identifying and Studying the Development of the "Light Phenomenon" in Hardened Ni-Cr and Ni-Cr-Co Alloys. **Identification et étude du développement du "light phenomenon" dans les alliages Ni-Cr et Ni-Cr-Co à durcissement structural.** Charlotte Bückel and Jean-Pierre Poulignier. *Comptes Rendus*, v. 244, May 6, 1957, p. 2385-2388.

A systematic observation of structural features caused by tempering and annealing treatment.

13646* (French.) Elimination of Vacancies in Very Pure Aluminum. **Etude de l'élimination des lacunes dans les aluminiums très purs.** Michel Wintenberger. *Comptes Rendus*, v. 244, June 3, 1957, p. 2800-2803.

The excess vacancies caused by dislocations are eliminated according to a mechanism similar to that proposed by Cottrell for the movement of C atoms in Fe by means of dislocations. The density of the dislocations created in pure Al by plastic deformation is calculated.

13647 Influence of the Carbon-Silicon Ratio on Graphitization of Malleable Iron. Ariel Taub and Ehud Avivi. *Foundry*, v. 85, July 1957, p. 101-103.

A functional relationship exists between the C-to-Si ratio and the time required for decomposition of cementite, provided that the Mn-to-S relationship is satisfactory.

13648 The Effect of Transformation Cooling Rate on the Activation Energy Required for Recrystallization of Beta Quenched Uranium. H. R. Gardner and J. W. Riches. *Hanford Atomic Products Operation (U. S. Atomic Energy Commission)*, HW-48340, Mar. 1957, 31 p. (UF767 Un3.1hw Contin.)

A relationship was established between the lattice strain induced in U during quenching from the β-phase and the activation energy required for α-phase recrystallization. As the cooling rate increases, the activation energy decreases.

13649 The Formation of Kink Bands During the Compression of Polycrystalline 70:30 Brass. M. Hatherly and L. E. Samuels. *Institute of Metals, Journal*, v. 85, June 1957, p. 437-440 + 2 plates.

13650 Solid-Solution Hardening of Aluminium and Magnesium. D. Hardie and R. N. Parkins. *Institute of Metals, Journal*, v. 85, June 1957, p. 449-455.

Hardening of metals by elements in solid solution is primarily dependent upon the extent to which the lattice is distorted by the presence of the solute atoms and can be generally estimated by application of the Nabarro equation.

13651 (French.) A Contribution to the Study of the Macrographic and Micrographic Structures of Gray Cast Iron for Steel Plant Ingot Molds. **Contribution a l'étude des structures macrographiques et micrographiques de la fonte grise pour lingotières d'aciéries.** M. L. Beaujard and S. Béchet. *Institut de Recherches de la Sidérurgie, Publications*, ser. A, no. 169, May 1957, p. 1-10. (Reprinted from *"Fonderie"*, no. 133, Feb. 1957, p. 80-89.) (TN602 In7p Vis.)

Tests show that above a casting temperature of 1200 to 1220 C the sulfides (Fe-Mn)S became more dendritic as the temperature increased; the micrographic surface structure was a function of casting temperature and mass of the specimen.

13652* (Swedish.) Research on Carbides in Alloy Steels. **Undersökningar över karbider i legerade stål.** Kehsin Kuo. *Jernkontorets Annaler*, v. 141, no. 4, 1957, p. 206-230.

Tempering of carbon steels. Partition of alloy elements between cementite and ferrite. Precipitation of alloy carbides and secondary hardening. Alloy carbides in W and W-Cr steels.

13653 The Effect of Ordering on the Slip Patterns of Deformed Ni_3Mn Alloy. Tadami Taoka and Ryukichi Honda. *Journal of Electronmicroscopy (Annual Edition)*, v. 5, 1957, p. 19-22.

An elementary structure is noted in an ordered state, and a coarse slip in the disordered state. These slip patterns indicate two different mechanisms of plastic deformation.

13654 Observation of Precipitates and Inclusions in Steel by Extraction Replica Technique. Iku Uchiyama, Akira Fukami, and Shinjirô Katagiri. *Journal of Electronmicroscopy (Annual Edition)*, v. 5, 1957, p. 28-33.

Evaporated carbon film is used. Sodium chloride solution sprayed on the film evaporates, leaving crystals which reveal the electron diffraction pattern of the specimen.

13655* (French.) Images of Strained Metal Samples, Obtained With the Photoemission Microscope. **Images d'échantillons métalliques contraints obteneues au microscope a**

photoémission. R. Bernard, C. Guillaud, and R. Goutte. *Journal de Physique et le Radium*, v. 18, May 1957, p. 327-330.

Studies with Au samples show an increased brightness in areas of maximum strain (breaking zone), probably due to a local increase of the photoelectric emission factor.

13656* (French.) A Contribution to the Study of Copper-Beryllium Alloys. **Contribution a l'étude des alliages cuivre-béryllium.** Arunachala Viswanathan. *Journal des Recherches du Centre National de la Recherche Scientifique*, v. 7, Dec. 1956, p. 303-318.

The structure of Cu-Be alloy films depends on their thickness. A study of vapor deposited coatings.

13657* The Structure of Silver Electrodeposited From a Complex Silver Iodide Bath on a Silver (110) Face. T. H. V. Setty. *Journal of Scientific & Industrial Research*, v. 16, sec. B, Apr. 1957, p. 139-143.

The Ag was deposited at different bath conditions by varying the pH, temperature, and current density and the surface structure was studied at different deposit thicknesses.

13658* Influence of Impurities on the Structure of Electrodeposited Nickel. B. C. Banerjee and A. Goswami. *Journal of Scientific & Industrial Research*, v. 16, sec. B, Apr. 1957, p. 144-148.

Development of [110] orientation is due to an inadequate supply of metal ions to the catholyte layer as a result of the formation of films or metal complexes.

13659* (Russian.) Application of Electron and Ion Microscope Projectors in the Study of Gas Adsorption in Metals. **Primenenie electronnogo i ionnogo mikroskopov- proektorov dlia izucheniia adsorbtsii gazov na metallakh.** I. I. Tret'iakov. *Khimicheskaia Nauka i Promyshlennost*, v. 2, no. 2, 1957, p. 181-189.

Investigation of the adsorption of oxygen and other gases on tungsten.

13660* (Russian.) The Effect of Deformation at Low Temperatures on Phase Transformations and Properties of Austenitic Steel of Type 1X18H9T. **Vliianie deformatsii pri nizkikh temperaturakh na fazovye prevrasheheniia i svoistva austenitnoi stali 1X18H9T.** A. P. Guliaev and I. V. Chernenko. *Metallovedenie i Obrabotka Metallov*, no. 5, May 1957, p. 2-7.

Transformation of austenitic steel at low temperatures, and the reversible transformation upon heating of deformed samples at 300 to 500 C. Change of mechanical properties of austenitic steel in relation to temperature.

13661* (Russian.) The Effect of Additives in Aluminum on Reactive Diffusion Rate. **Vliianie dobavok k aliuminiiu na skorost' reaktivnoi diffuzii.** D. I. Lainer and A. Ia. Potemkin. *Metallovedenie i Obrabotka Metallov*, no. 5, May 1957, p. 33-35.

Effect of chemical composition of Al on diffusion in aluminized Ni.

13662 Magnetic Analogy of a Dislocation. A. G. Guy and L. G. Criswell. *Metal Progress*, v. 71, June 1957, p. 82-84.

Two rows of equally spaced magnets, the upper one swung like a pendulum, form a physical model which illustrates that the force necessary to cause slip in a perfect crystal is much greater than in a crystal containing dislocations.

13663 A New Method of Observing Magnetic Transformations. M. Blackman, G. Haigh, and N. D. Lisgarten. *Nature*, v. 179, June 22, 1957, p. 1288-1290.

In experiments it has been possible to demonstrate magnetic transformations visually on the fluorescent screen of an electron diffraction camera, and to photograph the various stages in the transformation.

13664* The Recrystallization of Some Processed Metals Under Variable Stress. John N. Kenyon. *New York Academy of Sciences, Transactions*, v. 19, May 1957, p. 641-649.

Crystalline changes that occur under variable stress may well account for service failures otherwise unexplainable. Some mathematical misconceptions are discussed.

13665 Anodizing as a Metallographic Technique for Zirconium Base Alloys. M. L. Picklesimer. *Oak Ridge National Laboratory (U. S. Atomic Energy Commission)*, ORNL-2296, May 1957, 14 p. (UF767 U3o Contin.)

Technique is useful for phase identification, improvement of optical contrast of microstructures in both bright field and polarized light examination, and as a permanent preservative for the etched surface of a specimen. It is also used on U and Ti base alloys.

13666 Stacking Faults in Face-Centered Cubic Metals and Alloys. R. E. Smallman and K. H. Westmacott. *Philosophical Magazine*, v. 2, ser. 8, May 1957, p. 669-683.

Stacking faults on the (111) planes of several face-centered cubic metals and alloys were introduced by cold work, and estimates of the stacking fault probability were obtained from changes produced in the Debye-Scherrer spectrum. The faulting probability increases on alloying, from one plane in 300 in Cu to one plane in 25 for some high solute content alloys containing Zn, Al, Sn, or Ge.

13667* (English.) **Study of Metallic Carbides by Electron Diffraction. I. Formation and Decomposition of Nickel Carbide.** Sigemaro Nagakura. *Physical Society of Japan, Journal*, v. 12, May 1957, p. 482-494.

Thin Ni films formed by evaporation were carburized in CO gas stream at temperatures from 250 to 500 C and were studied by electron diffraction. Only Ni_3C was found to be formed. This has close-packed hexagonal arrangement of Ni atoms with lattice constants $a_0=2.628$ A and $c_0=4.306$ A.

13668* Self-Diffusion in Gold. S. M. Makin, A. H. Rowe, and A. D. LeClaire. *Physical Society, Proceedings*, v. 70, no. 450B, June 1, 1957, p. 545-552.

Measurements in the temperature range 704 to 1048 C using the sectioning method on 99.95% purity Au.

13669 Ambipolar and Exciton Diffusion in CdS Crystals. G. Diemer and W. Hoogenstraaten. *Physics and Chemistry of Solids*, v. 2, Apr. 1957, p. 119-130.

The diffusion of photoconductivity in nonilluminated parts of CdS single crystals was studied both on unactivated samples and on samples activated with Ag.

13670 Electron Scattering in InSb. H. Ehrenreich. *Physics and Chemistry of Solids*, v. 2, Apr. 1957, p. 131-149.

The important scattering mechanisms are applied to transport calculations of the mobility and thermoelectric power above 200 K.

13671* (French.) The Theory of the Decomposition of Austenite. **La théorie de la décomposition de l'austénite.** Robert Franklin Mehl. *Revue de Métallurgie*, v. 54, Apr. 1957, p. 245-256.

Nucleation and growth processes; role of diffusion; capillarity; structure and energy of interfaces between phases and of the grain boundary and crystal imperfections.

13672* (French.) Dilatometric Study of Uranium in the α Phase. **Étude dilatométrique de l'uranium dans le domaine α.** P. Lehr and J. P. Langeron. *Revue de Métallurgie*, v. 54, Apr. 1957, p. 257-269.

Water quenching of the β phase suppresses all prior texture and gives an α grain size sufficiently small to establish a statistical compensation of the expansion anisotropy of each grain. Stresses involved by fast cooling in the $\beta \rightarrow \alpha$ range are sufficient to produce a recristallization of the metal during further annealing in the α phase.

13673* (French.) Determination of Liquidus Minima in Platinum Metal Systems by High Temperature Microscopy. **Détermination des joints de fusion minima des systèmes des platinoides au microscope à dispositif chauffant.** Gerhard Reinacher. *Revue de Métallurgie*, v. 54, May 1957, p. 321-336.

Description of a vacuum hot stage for the microscopic observation of metallographic specimens up to temperatures of 1500 C. Application to the determination of the depression of melting points of Pt metals caused by B, P, or Si additions; observation of the solidus temperatures of polished specimens of these alloys.

13674* (French.) A Contribution to the Study of Aging in Mild Steels. **Contribution à la connaissance du vieillissement des aciers doux.** E. Herzog, V. Chentre, J. Boyet, and M. Hugo. *Revue de Métallurgie*, v. 54, May 1957, p. 337-353.

Application of micro-tensile tests and electrical resistivity measurements between 20 and 300 C to the study of aging of mild steels deoxidized with C + Mn, Si + Al or Si + Al + Ti. Similar studies with several steels containing about 1% Ti or Al.

13675* (Polish.) Studies on the Dispersion Hardening of Tin Bronzes. **Z badań nad utwardzaniem dyspersyjnym brązów cynowych.** Fryderyk Staub and Mieczysław Tokarski. *Rudy i Metale Niezelazne*, v. 2, Mar. 1957, p. 8-13.

Structure, properties, and applications of CuSn6 bronze. Theory of dispersion hardening. Experimental data.

13676* (Czech.) Development of Structural Diagrams of Cast Iron. **Vývoj strukturních diagramů litin.** Miroslav Skála. *Slévárenství*, v. 5, May 1957, p. 129-135.

A critical review of the actual structural diagrams of cast iron.

13677 Autoradiographic Study for the Distribution of Thorium in Magnesium Alloys. Kurt Wolfsberg and George John. *Wright Air Development Center, Materials Laboratory, WADC Technical Report* 56-409, Nov. 1956, 37 p. (TL507 Un3.18w Vis.)

Study of alloys containing 3 and 13% Th by means of a modified stripping film method shows qualitatively that a large percentage of the Th is located in or very near to the grain boundaries.

13678* (German.) Development of "Self Targets" for the Nuclear Reaction D (d,n) He^3, and Its Relation With the Problem of Hydrogen Diffusion in Metals. **Die Bildung von "Selbsttargets" für die Kernreaktion D (d,n) He^3 und ihr Zusammenhang mit dem Problem der Wasserstoffdiffusion in Metallen.** Klaus Fiebiger. *Zeitschrift für Angewandte Physik*, v. 9, May 1957, p. 213-223.

Correlation of saturation time for the nuclear reaction with diffusion processes and mechanisms.

13679* (German.) Solubility of Hydrogen in Alloys. **Löslichkeit von Wasserstoff in Legierungen. II.** The Nickel-Zinc System. **Das System Nickel-Zink.** K. H. Lieser and G. Rinck. *Zeitschrift für Elektrochemie*, v. 61, no. 3, 1957, p. 357-359.

13680* (German.) The Cerium-Aluminum System. **Beitrag zur Kenntnis des Systems Cer-Aluminium.** Jan H. N. van Vucht. *Zeitschrift für Metallkunde*, v. 48, May 1957, p. 253-258.

System was investigated by metallographic, thermal analysis, and X-ray diffraction methods for Ce concentrations above 50 at.%. Two allotropic phases of Ce_2Al were found.

13681* (Russian.) Investigation of the Fe-Ni-Co System in the Region of the Metal Compounds Ni_3Fe and FeCo. **Issledovanie sistemy Fe-Ni-Co v oblasti metallicheskikh soedinenii Ni_3Fe i FeCo. III.** Metallic Compound FeCo and the Region of Its Existence in the System Fe-Co. **Metallicheskoe soedinenie FeCo i oblast' ego sushchestvovaniia v sisteme Fe-Co. IV.** Region of Existence of the Metal Compound FeCo in the Fe-Ni-Co System. **Oblast' sushchestvovaniia metallicheskogo soedineniia FeCo v sisteme Fe-Ni-Co.** I. M. Viting. *Zhurnal Neorganicheskoi Khimii*, v. 2, no. 4, 1957, p. 845-859 + 2 plates.

13682* (Russian.) Constitution Diagram of the Ternary Ni-Cr-W System. **Diagramma sostoianiia troinoi sistemy Ni-Cr-W.** I. I. Kornilov and P. B. Budberg. *Zhurnal Neorganicheskoi Khimii*, v. 2, no. 4, 1957, p. 860-867 + 1 plate.

Investigation of 44 alloys. Determination of fusibility, the limits of their phase regions and their crystal-lattice parameters.

See also: **12653** (extraction of carbides from steel); **12996** (microscopy of metal aerosols); **13070** (growth of films on Ag single crystals); **13415** (structure of oxide coatings on Fe-Ni alloys); **13555** (structure of Ni steels); **13559** (dislocation-climb creep model); **13569** (lattice defects in cold-worked metals).

METALS—POWDER

13683* (French.) Preparation and Composition of Lithium Silicides. **Sur la préparation et la composition des siliciures de lithium.** Émile Masdupuy. *Comptes Rendus*, v. 244, May 6, 1957, p. 2390-2393.

Si and LiH were intimately mixed and sintered in argon atmosphere at 600 C. The resulting compact was a mixture of silicides, probably Li_4Si_2 and Li_8Si_2, as well as some hydride and Si that did not react.

13684 High-Temperature Properties of Molybdenum-Rich Alloy Compositions Made by Powder Metallurgy Methods. W. L. Bruckart and R. I. Jaffee. Paper from "Symposium on Metallic Materials for Service at Temperatures Above 1600 F". 1956. p. 111-134. American Society for Testing Materials. (TA460 Am35sm)

The effects of metallic and oxide additions on creep-rupture properties and on resistance to recrystallization were studied. Nonmetallic dispersions provided greater increases in rupture time than solid solution additions. Outstanding among the nonmetallics were ZrO_2 and TiO_2. Silicon was the outstanding metallic alloying addition. At 1800 F, some of the oxide additions increased the rupture strength of Mo almost fourfold.

13685 Factors Affecting the Strength of Sintered Steel Parts. Robert Talmage. *Machine Design*, v. 29, June 27, 1957, p. 110-112.

Effects of alloying additions, pressing variables, and sintering treatment.

13686 Health and Safety in Powder Metal Handling. W. B. Harris. *New York Operations Office (U. S. Atomic Energy Commission)*, NYO-4869, Apr. 1957, 18 p. (UF767 U3ny Contin.)

Use of metal powders of interest to the Atomic Energy Program. Properties of powders which present unusual problems of health and safety. Protective measures and equipment for controlling fire, explosion, and health hazards.

13687* (Polish.) Investigation of Copper Powder Electrodes. **Badania nad proszkowymi elektrodami miedzianymi. II.** Different Copper Preparations as Materials for Conventional and Complex Powder Electrodes. **Rózne preparaty miedzi jako materiał elektrod proszkowych pierwszego rodzaju i złożonych.** W. Tomassi and H. Wróbel. *Przemysł Chemiczny*, v. 13, Apr. 1957, p. 207-211.

Behavior of Cu powder electrodes in solutions of Cu and other ions was investigated.

13688 The Effect of Irradiation on the Properties of Boron-Stainless Steel Powder Dispersion Samples. J. D. Eichenberg. *Westinghouse Electric Corporation, Atomic Power Division (U. S. Atomic Energy Commission)*, WAPD-160, Jan. 1957, 27 p. (UF767 Un3.1wa Contin.)

Tests on extruded bars in an effort to fabricate cheaper reactor control rods. The radiated specimens showed considerable embrittlement.

13689 Improvement of the Impact Resistance of Cermets. A. C. Pezzi and H. P. Kling. *Wright Air Development Center, Materials Laboratory, WADC Technical Report* 56-329, Apr. 1957, 27 p. (TL507 Un3.18w Vis.)

Application to K161B bars of 0.018 in. of electrodeposited Ni, bonded by a suitable vacuum heat treatment, raised the impact strength from values of 2.56 and 3.36 in.-lbs. at room temperature and 1800 F respectively to values of 21.48 and 18.96 in.-lbs. at the same temperatures.

NONDESTRUCTIVE TESTING AND QUALITY CONTROL

13690* Automatic Flaw Detection by Ultrasonics. *Automation Progress*, v. 2, June 1957, p. 276 + 2 pages.

Automatic scanning and alarm system eliminates manual operations, makes equipment suitable for integration in a continuous production line.

13691* (Russian.) New Methods of Inspecting Butt Welds of Steam Pipes Made From Austenitic Steel. **Novyi metod kontrolia svarnykh stykov paroprovoda iz austenitnykh stalei.** M. R. Gubanova and V. P. Pushkin. *Energomashinostroenie*, v. 3, May 1957, p. 22-25.

Description of the ultrasonic method of inspection, first as a laboratory investigation and then as applied in industry.

13692* (German.) Inspection of Material With Ultrasonics. **Materialprüfung mit Ultraschall.** Ernst A. W. Müller. *ETZ, Elektrotechnische Zeitschrift*, v. 9, Ausgabe B, Apr. 1957, p. 112-117.

Advantages of ultrasonic testing over X-ray and γ-ray testing. Practical applications of ultrasonic testing.

13693 Are You Gaging Your Screw Threads Accurately? *Iron Age*, v. 170, July 4, 1957, p. 82-84.

Some techniques in proper use of available gages.

13694 (English.) **Iron and Steel Technique in Japan Today.** 108 p. 1957. Steel Technology Joint Research Society, Tokyo. (TN704.J3 Ir6)

Techniques for control of quality, production, and energy. Examples of technical control in representative companies. Inspection equipment and techniques.

13695* Ultrasonic Transmission Tester. J. D. Ross and R. W. Leep. *Nondestructive Testing*, v. 15, May-June 1957, p. 152-154.

An ultrasonic pulse is transmitted through the object under inspection and the received pulse is checked for abnormal attenuation. The abnormally attenuated pulses can be counted as the object is scanned, and total count is a measure of the area over which the defect extends.

13696* Tensile Properties of Porosity-Graded 195 Alloy. Irving J. Feinberg. *Nondestructive Testing*, v. 15, May-June 1957, p. 168-173.

A radiographic classification procedure to obtain reliable porosity-grade assignments of Al alloys before assessing damage. Quantitative determinations of the damage to ultimate tensile strength, yield strength, and percent of elongation attendant upon elongated hydrogen-gas porosity. Expected minimum properties for material containing seven degrees of porosity.

13697 Quality Control and Statistical Methods. Edward M. Schrock. 2nd Rev. Ed. 246 p. 1957. Reinhold Publishing Corp., New York. (TS155 Sch75q2)

The operations of applying statistical methods to the problems of industrial quality control.

See also: **12586** (inspection of refractories); **13093** (inspection of capacitors); **13440** (quality control in steelmaking); **13474** (measurement of surface finish); **13500** (quality control of brass castings).

NUCLEAR PHYSICS, NUCLEONICS, AND RADIATION

13698* (English.) **The 148-keV Electric Quadrupole Transition in Tl^{200}.** B. Åström, B. Johansson, and I. Bergström. *Arkiv för Fysik*, v. 12, no. 3, 1957, p. 205-214.

Measurements of relative conversion intensities suggests a "pure" *E*2 transition. Delayed coincidence measurements showed that the half-life of the first excited state (0-) is 8 ± 2 mμ sec.

13699* (English.) **Some Electronic Instruments Used in Nuclear Spectroscopic Investigations.** Björn Åström. *Arkiv för Fysik*, v. 12, no. 3, 1957, p. 215-236.

Details of two complete pulse-height spectrometers for electromagnetic radiation and α particles respectively; also detectors and electronic devices used for counting and analyzing the detector-pulses.

13700* Pressurised Water Reactors for World Markets. *Atomics & Nuclear Energy*, v. 8, June 1957, p. 210-217.

Engineering and operating details of 10 Mw power plant.

13701 Neutron Spectrum of an Actinium-Beryllium Source. W. R. Dixon, Alice Bielesch, and K. W. Geiger. *Canadian Journal of Physics*, v. 35, June 1957, p. 699-702.

Spectrum was determined from proton recoil tracks in nuclear emulsions, and found to be in general agreement with the spectra of Po-α-Be and Ra-α-Be sources.

13702 Radiation Effects in Solids. Annual Report for July 1, 1956-July 1, 1957. R. Smoluchowski. *Carnegie Institute of Technology, Department of Physics (U. S. Atomic Energy Commission)*, NYO-7826, Apr. 1957, 8 p. (UF767 U3ny)

Progress report on studies with alkali halides and metals.

13703 The Economics of Nuclear Power Plant Design & Operation. Corbin Allardice. *Consulting Engineer*, v. 9, July 1957, p. 76-82.

13704* (Russian.) n,α Reactions of 14 Mev Neutron With Cadmium. **Reaktsii (n,α) 14 Mev neitronov s kadmiem.** B. G. Dzantiev, V. N. Levkovskii, and A. D. Malievskii. *Doklady Akademii Nauk SSSR*, v. 113, no. 3, Mar. 21, 1957, p. 537-540.

Investigation of (n,α)-reactions on Cd forming Pd-isotopes. Identification and characteristics of the products of the reaction.

13705 Bombardment Energy and Fission Product Yield Pattern; Protons on Th-232, U-233, and Th-230. William H. Jones. *Emory University (U. S. Atomic Energy Commission)*, ORO-162, 1956, 20 p. (UF767 Un3.1or Contin.)

13706 α-Ray Induced Luminescence of Gases. L. O. Brown and N. Miller. *Faraday Society, Transactions*, v. 53, June 1957, p. 748-759.

Indicates that luminescence induced by a fixed source of ^{210}PO in argon, carbon dioxide, and nitrogen results from energy transfer by collision.

13707* On a Time of Flight Method of Studying the Velocity Distribution of Neutrons From Diffusing Media. V. C. Deniz, S. B. D. Iyengar, and R. Ramanna. *Indian Academy of Sciences, Proceedings*, v. 45, sec. A, Apr. 1957, p. 205-214.

13708* Slowing Down and Diffusion of Neutrons in Beryllium Oxide. S. B. D. Iyengar, G. S. Mani, R. Ramanna, and N. Umakanth. *Indian Academy of Sciences, Proceedings*, v. 45, sec. A, Apr. 1957, p. 215-223.

13709 Dose Rates Produced From Gamma Ray Sources. J. G. Lewis. *Industrial and Engineering Chemistry*, v. 49, July 1957, p. 1197-1202.

A nomograph may be constructed for estimating dose rates in air, helping in the design of experiments, and planning for radiation work.

13710* Instrumentation and Control of the Oak Ridge Research Reactor. W. F. Mruk. *ISA Journal*, v. 4, June 1957, p. 206-211.

13711* Effective Capture Cross-Sections in the Fast Reactor Zephyr. H. Rose. *Journal of Nuclear Energy*, v. 5, no. 1, 1957, p. 4-15.

Data on numerous non-fissionable materials.

13712 The Variation of α of $_{92}U^{235}$ With Energy in the Intermediate-Energy Range. Sophie Oleksa. *Journal of Nuclear Energy*, v. 5, no. 1, 1957, p. 16-32.

Evaluation of resonance parameters.

13713 The Total Neutron Cross-Sections of Pd, Os, Ir, Mo, In, I, Ta, Th, and U^{238} in the Resonance Region. I. A. Radkevich, V. V. Vladimirsky, and V. V. Sokolovsky. *Journal of Nuclear Energy*, v. 5, no. 1, 1957, p. 92-107. (From *Atomnaia Energiia*, v. 1, no. 5, 1956, p. 55.)

13714* (French.) Spin of ^{235}U and Ratios of the Nuclear Moments of ^{235}U and ^{238}U. **Spin de ^{235}U et rapports des moments nucléaires de ^{235}U et ^{238}U.** Jean Blaise, Simon Gerstenkorn, and Michèle Louvegnies. *Journal de Physique et le Radium*, v. 18, May 1957, p. 318-319.

13715* (French.) Elastic Scattering of 3.8 MeV Tritons by Protons in Nuclear Track Emulsions. Diagrams of Effective Areas of Scattering in the System of the Center of Gravity as a Function of the Angle of Diffusion and of Energy. **Étude de la diffusion de tritons de 3,8 mev par des protons contenus dans une plaque photographique. Courbes donnant la section efficace dans le système du centre de gravité en fonction de l'angle de diffusion et de l'eńergie.** G. Baumann. *Journal de Physique et le Radium*, v. 18, May 1957, p. 337-344.

13716 A One-Cycle Process for the Recovery and Decontamination of Plutonium. H. Ward Alter, R. Fowler, Jr., and J. L. Mewherter. *Knolls Atomic Power Laboratory (U. S. Atomic Energy Commission)*, KAPL-1748, Jan. 1957, 29 p. (UF767 Un3.1ka Contin.)

Process yields Pu meeting activity specifications from spent reactor fuel. Main problems of decontamination can probably be solved with suitable flowsheet and equipment modifications.

13717 Gas Pressurization of Homogeneous Reactor Test. *Arthur D. Little, Inc. (U. S. Atomic Energy Commission)*, AECU-3349, Feb. 1956, 88 p. (UF767 U3au Contin.)

Oxygen is recommended as the most suitable gas for pressurization. Continuous injection and venting of O at the pressurizer is recommended as the most practical means of controlling explosive mixture concentration.

13718 Design Study for a 12-Bev Constant-Gradient Proton Synchrotron. H. V. Argo, et. al. *Los Alamos Scientific Laboratory (U. S. Atomic Energy Commission)*, LAMS-2102, May 1957, 126 p. (UF767 Un3.1La Contin.)

Engineering and physics aspects; requirements in personnel and money; design data.

13719 Lampre. A Molten Plutonium Fueled Reactor Concept. R. M. Kiehn. *Los Alamos Scientific Laboratory (U. S. Atomic Energy Commission)*, LA-2112, May 1957, 14 p. (UF767 U3La Contin.)

Preliminary design of the Los Alamos molten Pu reactor experiment.

13720* (French.) Effect of Intermittent Irradiation in Atomic Piles on the Activity of the Produced Isotopes. **Effet, sur l'activité des isotopes produits, de l'intermittence des irradiations dans les piles atomiques.** Héliodore Tellez Plasencia. *Memorial des Services Chimiques*, v. 14, 1955, p. 225-232.

The activities produced by means of intermittent irradiations were calculated for a sample cycle, an irregular weekly cycle, and an undeterminate cycle.

13721 Measurement of the Capture Cross Section of Thorium. James W. Wade. *E. I. du Pont de Nemours & Co., Savannah River Laboratory Technical Division (U. S. Atomic Energy Commission)*, DP-207, Feb. 1957, 11 p. (UF767 Un3.1dp Contin.)

Comparison of the Th absorption with that of a sample of Fe, taken to have a cross section of 2.53 barns for thermal neutrons, indicated a thermal absorption cross section of 7.55 ± 0.025 barns for Th.

13722* The Homogeneous Aqueous Reactor. II. I. Wells and D. Newby. *Nuclear Engineering*, v. 2, July 1957, p. 275-285 + 2 plates.

Examines some of the problems of the reactor, and describes in greater detail some specific reactors which have been proposed.

13723 Nuclear Engineering. Charles F. Bonilla, editor. 850 p. 1957. McGraw-Hill, New York. (TK9145 B64n)

Basic principles involved in the design of nuclear reactor cores and power plants.

13724* The Loading of Nuclear Emulsions With Water. C. J. Batty. *Nuclear Instruments*, v. 1, May 1957, p. 138-142.

The volume of the swollen emulsion is generally less than the sum of the volumes of water and dry emulsion, and this can effect cross-section measurements.

13725* Continuous Scanning in Two Directions of the Ion Beam in an Electromagnetic Isotope Separator. K. O. Nielsen and O. Skilbreid. *Nuclear Instruments*, v. 1, May 1957, p. 159-165.

Two thin needles, one horizontal and one vertical, are moved through the fixed beam. The amplitude of the needle oscillation can be adjusted so that the whole mass spectrum of any element, except H is covered.

13726* The Coulomb Excitation of U^{235}, Pu^{239}, and U^{238}. J. O. Newton. *Nuclear Physics*, v. 3, May 1957, p. 345-363.

Gamma rays from the Coulomb excitation of U^{235}, Pu^{239}, and U^{239} were observed with a xenon filled proportional counter. Energies of 46.23 ± 0.2, 56.74 ± 0.3, and 103.2 ± 1 k.e.v. with U^{235}, 49.6 ± 0.3 and 57.5 ± 0.3 k.e.v. with Pu^{239} and 44.7 ± 0.2 k.e.v. with U^{239} were obtained. The γ-rays are interpreted as arising from the decay of rotational states.

13727* Scattering of Fast Neutrons by Neon in the Energy Region 1.9 to 3.5 MeV. C. P. Sikkema. *Nuclear Physics*, v. 3, May 1957, p. 375-384.

The scattering of monoenergetic neutrons by neon in the neutron energy range 1.9 to 3.5 m.e.v. was investigated by measuring the neon recoils in a multiple-wire proportional counter with which a γ-ray background can be reduced to a very low value by an anticoincidence technique.

13728* An Investigation of the Reaction of ^{23}Na (d,n) ^{24}Mg. F. A. El Bedewi and M. A. El Wahab. *Nuclear Physics*, v. 3, May 1957, p. 385-390.

The photographic plate technique was used to investigate the neutrons emitted from the disintegration of Na by 8 MeV deuterons. The angular distributions of some neutron groups were compared with curves calculated from the known deuteron stripping theories.

13729* The Problem of an Effective Mass in Nuclear Matter. Victor F. Weisskopf. *Nuclear Physics*, v. 3, 1957, p. 423-432.

It is shown that the existence of nuclear matter and the independent particle description of its properties implies that the average potential energy is momentum dependent.

13730* Dounreay. The AEA's New Reactor Test Establishment. *Nuclear Power*, v. 2, June 1957, p. 221-248 + 1 plate.

Details of reactor facilities and operation.

13731 Choosing Storage Time to Minimize Processing Costs. J. W. Ullmann and E. D. Arnold. *Nucleonics*, v. 15, June 1957, p. 80-83.

To determine the optimum fuel cycle, the cost of storing spent fuel must be balanced against processing, refabrication, and shielding costs. These factors are considered for various fuels and reactor types.

13732 Fused-Fluoride Processing of Spent Uranium Fuel. Archie G. Buyers. *Nucleonics*, v. 15, June 1957, p. 86-89.

Fused fluorides can remove all but trace of Pu and 95-100% of fission products (except Ru) from molten U. Decontamination is less than that obtainable with aqueous processing but would be sufficient for fast breeders.

13733 Operating Characteristics of the Spark Counter. N. K. Saha and Narendra Nath. *Nucleonics*, v. 15, June 1957, p. 94-97.

Highly specific instrument is sensitive only to alphas. With a B plate it gives 1 count for 180 neutrons per $cm.^2$ but <1 count per hr. in a γ field of 1 R per sec.

13734 600 MW Fused Salt Homogeneous Reactor Power Plant. R. W. Davies, et. al. *Oak Ridge National Laboratory (U. S. Atomic Energy Commission)*, CF-56-8-208 (Del.), Aug. 1956, 260 p. (UF767 Un3.1cf Contin.)

Reactor is an intermediate energy type that operates at a power density of 55 watts per cc. with an enriched U-235 inventory of 240 kg. Net thermal plant efficiency is 38.2% at a maximum net electrical output of 229 MW.

13735 Preparation of Fission Rare-Earth Isotopes. R. S. Pressly. *Oak Ridge National Laboratory (U. S. Atomic Energy Commission)*, ORNL-2252, May 1957, 12 p. (UF767 U3o Contin.)

Separation and purification procedures.

13736 Radiation Damage to TBP and Diluents, Covering Period October-December 1956. J. H. Goode. *Oak Ridge National Laboratory (U. S. Atomic Energy Commission)*, ORNL-2287, May 1957, 15 p. (UF767 U3o Contin.)

Polymerization or other interaction between the radiation damage products of a hydrocarbon diluent and tributyl phosphate solvent, which is intensified by the presence of an aqueous phase and/or heat, results in the formation of emulsifiers, U complexing agents, and other deleterious materials in irradiated solvent. Vacuum distillation satisfactorily separates undamaged solvent from the higher boiling degradation products.

13737 Recovery and Half-Life Determination of I^{129}. H. T. Russell. *Oak Ridge National Laboratory (U. S. Atomic Energy Commission)*, ORNL-2293, May 1957, 5 p. (UF767 U3o Contin.)

13738 Thermal Radiation Measurement. *Operation Teapot (U. S. Atomic Energy Commission)*, WT-1187, Oct. 1956, 16 p. (UF767 Un3.1wt Contin.)

Measurements of thermal flux per unit area at distances of 5500, 6800, and 10,500 ft. from a nuclear detonation follow the inverse-square-law fall-off.

13739* The Dounreay Atomic Energy Establishment. *Petroleum Times*, v. 61, June 21, 1957, p. 531-534.

A general discussion of the installation.

13740 A Study of Protons Emitted From Aluminium, Iron and Rhodium on Bombardment With Neutrons of 13·2 MeV. G. Brown, G. C. Morrison, H. Muirhead, and W. T. Morton. *Philosophical Magazine*, v. 2, ser. 8, June 1957, p. 785-796.

Studied by using photographic emulsions.

13741 (English.) **Nuclear Spin Relaxation in Hydrogen. II. The Liquid.** Myer Bloom. *Physica*, v. 23, May 1957, p. 378-388.

For normal H_2 the proton spin relaxation time is found to be 0.18 sec. at 20.4 K. It increases with decreasing temperature and decreases with decreasing ortho-H_2 concentrations.

13742 Stopping Power of Some Metallic Elements for 19.8-Mev Protons. V. C. Burkig and K. R. MacKenzie. *Physical Review*, v. 106, ser. 2, June 1, 1957, p. 848-851.

The proton beam of the UCLA cyclotron was used to measure the stopping power per electron relative to Al for 23 elements from Be to Th.

13743 Scattering of Neutrons by Spin Waves in Magnetite. B. N. Brockhouse. *Physical Review*, v. 106, ser. 2, June 1, 1957, p. 859-864.

Energy distributions of 1.5 A neutrons diffusely scattered by a single crystal of magnetite in the region of the 111 reciprocal lattice point were measured.

13744 Hfs of the 5 $^2P_{3/2}$ State of In^{115} and In^{113}: Octupole Interactions in the Stable Isotopes of Indium. T. G. Eck and P. Kusch. *Physical Review*, v. 106, ser. 2, June 1, 1957, p. 958-964.

13745 Radiative Transition Widths in the *lp* Shell. Dieter Kurath. *Physical Review*, v. 106, ser. 2, June 1, 1957, p. 975-982.

The nuclear wave functions, obtained from a shell model with variable strength of spin-orbit coupling are used to compute *M*1 and *E*2 transition widths. Comparison with experiment is made for Be^9, B^{10}, B^{11}, and C^{13}.

13746 New Half-Life in the Family of Antimony Isotopes. H. Bosch and H. Munczek. *Physical Review*, v. 106, ser. 2, June 1, 1957, p. 983-985.

Evidence of a new half-life of 149 ± 4 hrs. was found.

13747 Internal Bremsstrahlung and Decay Scheme of Sb^{119}. J. L. Olsen, L. G. Mann, and M. Lindner. *Physical Review*, v. 106, ser. 2, June 1, 1957, p. 985-990.

13748 Photon Self-Absorption and Scattering by the 15.1-Mev Level in C^{12}. Evans Hayward and E. G. Fuller. *Physical Review*, v. 106, ser. 2, June 1, 1957, p. 991-995.

Value of 54.5 ± 9.3 e.v. for the ground state radiation width and 79 ± 16 e.v. for the total width of the level were found.

13749 Isomeric Transitions in the Rare-Earth Elements. C. L. Hammer and M. G. Stewart. *Physical Review*, v. 106, ser. 2, June 1, 1957, p. 1001-1007.

Four isomeric transitions were found and identified.

13750 Investigation of the Gamma Radiation Produced by Irradiating B^{10} With Protons in the Energy Range 0.7 to 3.0 Mev. S. E. Hunt, R. A. Pope, and W. W. Evans. *Physical Review*, v. 106, ser. 2, June 1, 1957, p. 1012-1015.

13751 Q-Value Measurements for Aluminum and Chlorine. D. M. Van Patter, W. C. Porter, and M. A. Rothman. *Physical Review*, v. 106, ser. 2, June 1, 1957, p. 1016-1019.

Nuclear reaction energies were measured using a 180° double-focusing magnetic spectrometer.

13752 Photon Scattering From Protons and Deuterons. R. H. Capps. *Physical Review*, v. 106, ser. 2, June 1, 1957, p. 1031-1042.

Calculations based on a model in which it is assumed that only electric and magnetic dipole photons scatter.

13753 Neutron Production by μ Mesons Which Penetrate Lead. B. F. Stearns, D. R. Jones, J. K. DePagter, and R. D. Sard. *Physical Review*, v. 106, ser. 2, June 1, 1957, p. 1043-1048.

13754 Radiation Effects of Free Oscillations in Synchrotrons. Irving G. Henry. *Physical Review*, v. 106, ser. 2, June 1, 1957, p. 1057-1061.

Expressions are found for radial and vertical free-oscillation amplitudes in synchrotrons taking particular account of the radiation emission.

13755 Pion Production in Pion-Nucleon Collisions. Leonard S. Rodberg. *Physical Review*, v. 106, ser. 2, June 1, 1957, p. 1090-1099.

Production of a single pion was studied using the Chew-Low formalism with *p*-wave coupling.

13756* Gamma Radiation Following Proton Capture in ^{35}Cl, ^{37}Cl and ^{39}K. II. Angular Distributions and Correlations. R. Berenbaum and J. H. Matthews. *Physical Society, Proceedings*, v. 70, no. 450A, June 1, 1957, p. 445-451.

13757* The L-Series Emission Spectrum of Krypton. H. R. Moore. *Physical Society, Proceedings*, v. 70, no. 450A, June 1, 1957, p. 466-473.

13758* (Russian.) Mass Spectrometer for Investigation of Processes That Occur During Collisions of Electrons and Ions With Molecules. **Mass-spektrometr dlia issledovaniia protsessov, proiskhodiashchikh pri stolknovenii elektronov i ionov s molekulami.** E. L. Frankevich and V. L. Talroze. *Pribory i Tekhnika Eksperimenta*, no. 2, Mar.-Apr. 1957, p. 48-53.

Description of mass spectrometer for studies of electronic and ionic impact.

13759* On the Elastic Scattering of Charged Particles by Nuclei in the Intermediate Energy Region. S. N. Ghoshal and B. B. Baliga. *Progress of Theoretical Physics*, v. 17, Apr. 1957, p. 556-560.

Expression obtained for the differential elastic scattering cross-section was used in the case of scattering of 32 m.e.v. protons from Au.

13760* The *l*-Forbidden Magnetic Dipole Transitions. Akito Arima, Hisashi Horie, and Mitsuo Sano. *Progress of Theoretical Physics*, v. 17, pr. 1957, p. 567-580.

The reduced matrix elements for *l*-forbidden magnetic dipole transitions in medium-weight nuclei are calculated on the basis of configuration mixing. Calculations are based upon simple perturbation theory.

13761 Radioactivity and Nuclear Physics. James M. Cork. 3rd Ed. 415 p. 1957. D. Van Nostrand Co., Princeton. (QC721 C81r3)

Text for an introductory course in nuclear physics at the upper undergraduate or beginning graduate level.

13762 Radioisotopes—A New Tool for Industry. Sidney Jefferson. 110 p. 1957. George Newnes, Ltd., London. (TK 91.45 J35r)

Industrial applications, including detection of leaks and checking thoroughness of mixing. Elementary fundamentals of radioactivity.

13763 Neutron Diffraction. III. The Study of Molecular Structure. G. E. Bacon. *Research*, v. 10, June 1957, p. 241-248.

Structure of water molecules and aliphatic and aromatic compounds.

13764 Electron Model Fixed Field Alternating Gradient Accelerator. F. T. Cole, R. O. Haxby, L. W. Jones, C. H. Pruett, and K. M. Terwilliger. *Review of Scientific Instruments*, v. 28, June 1957, p. 403-420.

In this 8-sector accelerator, electrons are betatron accelerated from 25 to 400 k.e.v. using both continuous and pulsed injection. The number of radial betatron oscillations per revolution may be varied from 2.3 to 3 and the number of vertical oscillations per revolution from 1 to 3.

13765 Monoenergetic Absorption Peaks Obtained With a Scintillation Spectrometer. J. Richard Haskins. *Review of Scientific Instruments*, v. 28, June 1957, p. 425-426.

13766* Products Resulting From the Irradiation of Uranium. J. E. Littlechild. *Royal Institute of Chemistry, Journal*, v. 81, June 1957, p. 433-445.

The special nature of fission products resulting from irradiation in various types of reactors creates many interesting problems both in design and operation of processing plant.

13767 Ionization by Positive Ions. H. B. Gilbody and J. B. Hasted. *Royal Society, Proceedings*, v. 240, ser. A, June 11, 1957, p. 382-395.

A method of measuring the ionization cross-section of atoms of positive ions, in which electrons are collected from single collisions of an ion beam passing through a gas at low pressures. Measurements are given for 23 cases.

13768 Radioactivity of People and Foods. Ernest C. Anderson, Robert L. Schuch, William R. Fisher, and Wright Langham. *Science*, v. 125, June 28, 1957, p. 1273-1278.

Measurements of present levels of Cs^{137} in people indicate that it is of little significance in the potential hazard of radioactive fallout from weapons testing programs. Its presence in people and foods may, however, be a direct and simple measure of fallout rate.

13769 Elementary Particles. Murray Gell-Mann and E. P. Rosenbaum. *Scientific American*, v. 197, July 1957, p. 72 + 15 pages.

An account of the abstract theoretical ideas which physicists use to help them understand the material world. These ideas begin to show some order in the jumble of subatomic particles.

13770 (German.) Nuclear Reactors. **Energiereaktoren. II.** Fast Neutrons. **Schnelle Reaktoren.** H. Hessel. *Technik*, v. 12, Apr. 1957, p. 312-315.

Behavior of fast neutrons. Survey of existing fast reactors, and their importance in solving many scientific problems.

13771 A Wide Range, Gamma Sensitive, Liquid Flow Monitor. K. F. Sinclair. *U. S. Naval Radiological Defense Laboratory; Research and Development Technical Report*, USNRDL-TR-115 NS 088-001, Oct. 1956, 19 p. (QC475 Un3.5r Contin.)

System covers seven decades and at maximum sensitivity will detect 5×10^{-4} microcuries per liter at 1.2 m.e.v.

13772 Relative Decontamination of Clean and Artifically Soiled Navy Gray Paint Surfaces. J. L. Mackin. *U. S. Naval Radiological Defense Laboratory, Research and Development Technical Report*, USNRDL-TR-130 NS 086-001, Jan. 1957, 22 p. (QC475 Un3.5r Contin.)

Contamination studies with Nb^{95}, Sr^{89}, Y^{91}, Ce^{144}, and I^{131} show considerably greater difficulty in cleaning and decontaminating soiled surfaces.

13773 Scattering of Gamma Rays by Protons Below Neutral Meson Threshold. Larry L. Higgins. *University of California, Radiation Laboratory (U. S. Atomic Energy Commission)*, UCRL-3688, Feb. 1957, 88 p. (UF767 U3u Contin.)

The differential cross section for the elastic scattering of γ-rays by protons at 90° was measured in the region from 40 to 132 m.e.v. The cross section increases with proton energy.

13774 A Description of a Shock Wave in Free Particle Hydrodynamics With Internal Magnetic Fields. Stirling A. Colgate. *University of California, Radiation Laboratory (U. S. Atomic Energy Commission)*, UCRL-4829, Feb. 1957, 20 p. (UF767 U3u Contin.)

13775 Coincidence Nuclear Spectrometry With Applications to Europium-154 and Europium-155. Jose O. Juliano. *University of California, Radiation Laboratory (U. S. Atomic Energy Commission)*, UCRL-3733, Apr. 1957, 105 p. (UF767 U3u)

An iron-free β-ray spectrometer for electron-electron or electron-gamma coincidences using a time-to-height converter as a coincidence unit was constructed. A decay scheme is proposed for Eu^{154} and Eu^{155}. Relative intensities of the stronger conversion-electron lines of Th^{231} were determined with a thin-window magnetic spectrometer.

13776 The Total Cross Sections for 190-Mev Positively Charged K Mesons in Complex Nuclei. Leroy Thomas Kerth. *University of California, Radiation Laboratory (U. S. Atomic Energy Commission)*, UCRL-3747, Apr. 1957, 40 p. (UF767 U3u)

Attenuation and differential scattering cross sections were measured using C, Al, Cu, Ag, and Pb targets.

13777 Study of the Feasibility of Aqueous Recovery of Spent Fuels. V. Instrumentation Design Data. M. H. Winsnes. *University of Michigan, Engineering Research Institute (U. S. Atomic Energy Commission)*, AECU-3430, July 1954, 42 p. (UF767 U3au Contin.)

A preliminary study of the instrumentation for the Detroit Edison aqueous recovery plant.

13778* (Russian.) π-Mesons. **π-Mezony.** L. M. Barkov and B. A. Nikol'skii. *Uspekhi Fizicheskikh Nauk*, v. 61, Mar. 1957, p. 341-398.

Systematization of known experimental data concerning the properties of π-mesons and their interaction with nucleons and the nucleus.

13779 Radiochemistry of Third PWR Fuel Material Test X-1 Loop NRX Reactor. Paul W. Frank, Kenneth H. Vogel, and Paul Cohen. *Westinghouse Electric Corporation Atomic Power Division (U. S. Atomic Energy Commission)*, WAPD-TM-29, Feb. 1957, 63 p. (UF767 Un3.1wa Contin.)

The release of fission product activity and its distribution in a prototype PWR loop were studied.

13780 The Effects of Irradiation Cycling on Pressurized Water Reactor Blanket Fuel Elements. John D. Eichenberg. *Westinghouse Electric Corporation, Atomic Power Division (U. S. Atomic Energy Commission)*, WAPD-167, Mar. 1957, 37 p. + 8 plates. (UF767 Un3.1wa Contin.)

Irradiation produced no dimensional changes in the rods. Center melting occurred in the UO_2 from a defected specimen; neither melting nor grain growth was obtained in the undefected specimen.

13781 Release of Fission Gases From NO_2. B. Lustman. *Westinghouse Electric Corporation, Atomic Power Division (U. S. Atomic Energy Commission)*, WAPD-173, Mar. 1957, 29 p. (UF767 Un3.1wa Contin.)

The release of fission gases from irradiated UO_2 is in all probability controlled by diffusion of the gases from the oxide matrix.

13782 Technical Progress Report. Pressurized Water Reactor (PWR) Project. *Westinghouse Electric Corporation, Atomic Power Division (U. S. Atomic Energy Commission)*, WAPD-MRP-67, Apr. 1957, 76 p. (UF767 Un3.1wa Contin.)

Power plant anlysis and systems; components and component materials and tests; control mechanisms and tests; reactor and auxiliaries; core engineering; metallurgy of core materials; chemistry and in-pile loop engineering; reactor physics.

13783* (Russian.) On the Absorption of High Energy Radioactive Particles. **O pogloshchenii iadernoaktivnykh chastits bol'shikh energii.** S. Z. Belenkii and N. M. Gerasimova. *Zhurnal Eksperimental'noi i Teoreticheskoi Fiziki*, v. 32, Mar. 1957, p. 547-551.

The propagation of radioactive particles in matter is computed from cross sections obtained on the basis of the hydrodynamic theory of multiple production of particles.

See also: **12699** (analytical control laboratory); **12700** (analysis of fuel processing solutions); **13125** (radiation monitor); **13168** (Sweden's 1957 nuclear energy budget); **13265** (evaluation of atomic explosions); **13337** (lubricants for reactors); **13387** (metallurgical aspects of Calder Hall); **13484** (casting of fuel elements); **13531** (radiation damage in U-Zr alloys); **13833** (radiation damage in MgO); **13908** (treatment of reactor wastes); **13912** (Sr^{90} concentration in materials); **13974** (sealing ends of fuel rods); **13991** (welding of nuclear reactor components).

OPERATIONS RESEARCH AND MANAGEMENT ENGINEERING

13784 Improving Managerial Performance, With a Paper on Corporate Aid to Education. *American Management Association, General Management Series No.* 186, 1957 70 p. (HD28 Am35g Vis.)

Papers deal with introduction of changes in industrial organizations and in individual performance; developing the executive of tomorrow; motivation of the engineering and research specialist.

13785 Improved Techniques for Administration and Control. *American Management Association, General Management Series No.* 187, 1957, 64 p. (HD28 Am35g Vis.)

Papers cover management control through the operating committee; cost reduction; a philosophy of executive compensation; what top management should know about electronic data processing; scientific aids to decision making; administration of the research function; and communication as a key to new product development.

13786* Psychology and the Design of Machines. Franklin V. Taylor. *American Psychologist*, v. 12, May 1957, p. 249-258.

Human engineering technology; man-machine systems evaluation; engineering properties of the man; relation between psychological and physical sciences.

13787 Evaluating Engineers and Scientists for a Research and Development Activity. R. A. Martin and J. Pachares. *Institute of Radio Engineers, Transactions on Engineering Management*, v. EM-4, June 1957, p. 50-61. (TK1 In6.6em Contin.)

Some statistical techniques which might reduce the randomness of nonobjective considerations. Equations are developed as guides in determining entrance ratings and the expected rate of salary growth.

13788 Case Studies in Foreign Operations. *International Management Association, IMA Special Report No.* 1, 1957, 237 p. (HF1456 In8s Vis.)

Five companies with record achievements overseas present detailed discussions of their foreign operations, showing how each element and activity fits into the over-all framework of successful operation.

13789* The Elimination Form of the Inverse and Its Application to Linear Programming. Harry M. Markowitz. *Management Science*, v. 3, Apr. 1957, p. 255-269.

Form is especially convenient to obtain and use for matrices with a high percentage of zeros.

13790* Operations Research Determination of Generation Reserves. E. Leonard Arnoff and John C. Chambers. *Power Apparatus and Systems*, no. 30, June 1957, p. 316-328.

Methods of determining when additional generating capacity should be added to a particular electrical utility system and also the size of new units.

13791 Supervisory and Executive Development. A Manual for Role Playing. Norman R. F. Maier, Allen R. Solem, and Ayesha A. Maier. 330 p. 1957. John Wiley & Sons, New York. (HF5549 M28s)

Presents 20 cases as examples of common situations arising in business relations for use in training by role playing and group discussions.

See also: **13158** (developing executives).

ORE AND MATERIALS BENEFICIATION

13792* (Russian.) Thermodynamics of Equilibrium Conditions in the Extraction of Uranyl Nitrate. **Termodinamika ekstraktsionnykh ravnovesii uranil-nitrata.** A. M. Rozen. *Atomnaia Energiia*, v. 2, May 1957, p. 445-458.

13793 Recovery of Thorium From Brazilian Monazite Sludge by Nitric Acid Digestion. W. A. Meeley, M. J. Snyder, and R. B. Filbert, Jr. *Battelle Memorial Institute (U. S. Atomic Energy Commission)*, BMI-946, Aug. 1954, 27 p. (UF767 U3b Contin.)

13794 Improved Technique for Determining the Softening Temperatures of Ores and Sinters. A. G. Astakhov. *Henry Brutcher Translation No.* 3903, 4 p. (From *Zavodskaia Laboratoriia*, v. 22, no. 5, 1956, p. 571-572.) Henry Brutcher, Altadena, Calif.

Application of an electrical bridge system is described.

13795 Recovery of Uranium Values From Ore and Concentrate Samples. Progress Report No. 3. *Colorado School of Mines Research Foundation (U. S. Atomic Energy Commission)*, RMO-2803, June 1955, 51 p. (UF767 U3r Contin.)

Laboratory batch tests were conducted to develop improvements in the flotation process.

13796 Recovery of Uranium Values From Ore and Concentrate Samples. Colorado Primary Ores. *Colorado School of Mines Research Foundation (U. S. Atomic Energy Commission)*, RMO-2805, June 1955, 69 p. (UF767 U3r Contin.)

Gravity concentration and flotation tests were made on four uraninite ores.

13797* Froth Flotation of Low-Rank Coal. II. A Statistical Investigation of Six Factors Influencing Froth Flotation. G. F. Eveson, Stacey G. Ward, and F. Worthington. *Institute of Fuel, Journal*, v. 30, June 1957, p. 298-309 + 2 plates.

Concentration of frother, in terms of the total volume of raw coal pulp, was the most important variable.

13798 Atmospheric vs Pressure Leaching of Uranium Ores. R. G. Beverly, A. W. Griffith, and W. A. Millsap. *Journal of Metals*, v. 9, June 1957, p. 746-751.

Pilot plant studies reveal that high temperature, high pressure leaching of U ores in alkaline solutions cuts leach time 90 to 95%. Leach times may be cut in half by using existing Pachuca tank equipment at moderate temperatures and pressures.

13799 Ammonium Carbonate Pressure Leaching of Uranium Ores. B. G. Langston, R. D. Macdonald, and F. M. Stephens, Jr. *Journal of Metals*, v. 9, June 1957, p. 752-756.

Studies of temperature, pressure, strength of solution, and the amount of oxidation required to convert the quadrivalent U to the hexavalent state, and of the operation of an integrated plant, demonstrated that the method is technically attractive for extraction of U from high-lime ores.

13800 Manganese From Low-Grade Ores by the Ammonium Carbamate Process. J. Y. Welsh and D. W. Peterson. *Journal of Metals*, v. 9, June 1957, p. 762-765.

Process is based on the fact that MnO forms a soluble complex in aqueous solutions containing high concentrations of ammonia and CO_2 and that this complex functions as an intermediate in the combination of MnO with CO_2 to form $MnCO_3$.

13801 Dissolution of Lead Sulfide Ores in Acid Chlorine Solutions. M. I. Sherman and J. D. H. Strickland. *Journal of Metals*, v. 9; *American Institute of Mining and Metallurgical Engineers, Transactions*, v. 209, June 1957, p. 795-800.

The rate of reaction of Cl in aqueous solutions with galena is first order and both sulfate and elemental S can be formed, the latter via the hydrolysis of S_2Cl_2 which adheres to the ore. The chemical rate constants were evaluated and the energy of activation found to be 21,000 cal. per mole.

13802* Direct Solvent Leaching of Uranium Ores. R. H. Bailes and J. E. Magner. *Mines Magazine*, v. 47, June 1957, p. 51-54.

Process using alkyl phosphate extractants may result in important savings in materials-handling operations, and acid and water consumption.

13803* (Russian.) Treatment of High-Silica Iron Ores in Rotary Kilns. **Pererabotka vysokokremnezemistykh rud v kriehnykh pechakh.** V. Kiuncher and I. Shleier. *Stal'*, v. 17, May 1957, p. 392-401.

Rotary kilns enable more economical utilization of low-grade Fe ores than is possible with the calcination-magnetic or wet-mechanical concentration methods.

13804 Pilot-Plant Flotation of Manganese Ore From the Maggie Canyon Deposit, Artillery Mountains Region, Mohave County, Ariz. J. B. Rosenbaum, C. H. Schack, R. S. Lang, and J. B. Clemmer. *U. S. Bureau of Mines, Report of Investigations* 5330, Apr. 1957, 45 p. (TN21 Un3r)

Ore could be concentrated by oil-emulsion flotation to recover 80% of the Mn in a concentrate assaying 35.6% Mn, 16.8% SiO_2, 2.6% Al_2O_3, 2.8% Fe, and 0.08% P.

13805 Measurement and Nature of the Apparent Viscosity of Water Suspensions of Some Common Minerals. C. H. Schack, K. C. Dean, and S. M. Molloy. *U. S. Bureau of Mines, Report of Investigations* 5334, May 1957, 16 p. (TN21 Un3r)

Tests with quartz, feldspar, calcite, gypsum, muscovite, and pyrex glass indicate that viscosity is not significant in dilute ore pulps but becomes significant in handling mineral suspensions of over 35 to 45% solids.

13806 Washability Characteristics of Coal From San Juan County, N. Mex. W. L. Crentz. *U. S. Bureau of Mines, Report of Investigations* 5335 May 1957, 20 p. (TN21 Un3r)

13807 Heavy-Liquid Techniques for Rapid Evaluation of Sands by Prospectors and Plant Operators. B. H. Clemmons, R. H. Stacy, and J. S. Browning. *U. S. Bureau of Mines, Report of Investigations* 5340, May 1957, 12 p. (TN21 Un3r)

A field method for rapid determination of heavy minerals occurring in unconsolidated beach and dune sands. A modification suitable for plant use in determining the relative purity of heavy-mineral flotation concentrates. Specific application to determination of the amount of feldspar-quartz in spodumene flotation concentrates.

See also: **12579** (pulverization of coal); **12593** (crushability of materials); **13215** (fuel for sinter plants); **13240** (ore beneficiation).

PHYSICS

13808 Effect of Heat Radiation on Sound Propagation in Gases. P. W. Smith, Jr. *Acoustical Society of America, Journal*, v. 29, June 1957, p. 693-698.

The acoustic attenuation, which generally increases with decreasing frequency, will show a plateau of very flat peak near those frequencies at which one of the peaks of electromagnetic absorption reaches a value of 4π nepers per acoustic wavelength.

13809 Vibrations of Ferroelectric Cylindrical Shells With Transverse Isotropy. I. Radially Polarized Case. J. F. Haskins and J. L. Walsh. *Acoustical Society of America, Journal*, v. 29, June 1957, p. 729-734.

Expressions for the coupled mechanical vibrations and electrical admittance of ferroelectric tubes having transverse isotropy are derived and the results supported with experimental data. Coupled modes in radially polarized barium titanate tubes are examined as a function of length to radius ratio.

13810* (French.) A Study of the Structure of Transparent Thin Layers by Means of the Optical Properties. **Étude de la structure des couches minces transparentes a l'aide des propriétés optiques.** M. P. Bousquet. *Annales de Physique*, v. 2, Mar.-Apr. 1957, p. 163-213 + 1 plate.

Accurate determination of the optical properties of some thin transparent bodies. Comparison of results with those obtained in applying the simplified theory of a continuous, isotropic lamella limited by plane and parallel surfaces. Explanation of differences.

13811* Accurate Measuring of the Density of Solids, Using Helium as a Gaseous Medium. H. I. Waterman and P. M. J. Wolfs. *Applied Scientific Research*, v. 6, sec. A, nos. 5-6, 1957, p. 373-384.

Apparatus for determining the density of solids with an accuracy of at least ± 0.2% is based on the principle that a constant volume of a gaseous medium is displaced by the sample, displacement being measured by weighing the corresponding volume of Hg.

13812* Measurements on the Velocity of Sound in Nitrogen Under High Pressure. A. Van Itterbeek, W. De Rop, and G. Forrez. *Applied Scientific Research*, v. 6, sec. A, nos. 5-6, 1957, p. 421-432.

An acoustical interferometer for high pressures was used in measuring the velocity of sound in N gas between 1 and 75 atm. as a function of pressure and at different temperatures.

13813* On the Use of Matrices for Solving Periodic Heat Flow Problems. G. W. T. White. *Applied Scientific Research*, v. 6, sec. A, nos. 5-6, 1957, p. 433-444.

The temperature and heat flow on one side of a wall are related to the corresponding quantities on the other side of the wall by linear equations which, in matrix form, are useful in solving problems in which the wall consists of many parallel layers.

13814* The Internal Ballistics of a Recoil-Less High-Low Pressure Gun. J. N. Kapur. *Applied Scientific Research*, v. 6, sec. A, nos. 5-6, 1957, p. 445-466.

The equivalent non-leaking ballistic problem was studied and the equations integrated for the isothermal and partially non-isothermal models for this gun.

13815* (English.) **On the Lattice Vibrations in Cubic Ionic Crystals.** Stig O. Lundqvist. *Arkiv för Fysik*, v. 12, no. 3, 1957, p. 263-275.

Derivation of formulas from which the lattice vibrations of ionic lattices of the NaCl type can be calculated, allowing for the effects of deviations from the Cauchy relations, effective charge, and electronic polarization.

13816 Physics Below 1°K. E. Mendoza. *British Journal of Applied Physics*, v. 8, June 1957, p. 219-228.

At temperatures down to 3×10^{-3} K, a number of experiments were performed, not only on the refrigerants but also on other substances. Results from several branches of physics, including solid state and nuclear physics, are briefly presented and discussed. Below 3×10^{-3} K only the refrigerants have been investigated; the lowest temperature yet reached is about 2×10^{-5} K.

13817 Properties of Materials at Low Temperatures. I. R. J. Corruccini. *Chemical Engineering Progress*, v. 53, June 1957, p. 262-267.

Heat capacities and coefficients of thermal expansion are reported for numerous materials. (To be continued.)

13818 The Defect Solid State. T. J. Gray, D. P. Detwiler, D. E. Rase, W. G. Lawrence, R. R. West, and T. J. Jennings. 511 p. 1957. Interscience Publishers, New York. (QC125 G79d)

Defect nature of solids; semi-conductivity; diffusion in ionic lattices, sintering, and reactions in the solid state; corrosion processes; magnetic properties of solids; defect structure and catalysis; dielectric materials; phase equilibria, ceramic materials for high temperatures, intermetallic compounds, and experimental techniques.

13819 Luminescence of Modified Tin-Activated Strontium Orthophosphate. H. Koelmans and A. P. M. Cox. *Electrochemical Society, Journal*, v. 104, July 1957, p. 442-445.

The introduction of Al, Zn, Mg, Ca, or Cd in $Sr_3(PO_4)_2$ produces a new crystal phase which is probably isomorphous with β $Ca_3(PO_4)_2$. Activated with tin this Sr-orthophosphate gives a strong luminescence with a maximum at about 6300 A under excitation with 2537 A.

13820 Energy Transport by Cascade and Resonance Processes in Doubly Activated Phosphors. Esther W. Claffy and Clifford C. Klick. *Electrochemical Society, Journal*, v. 104, July 1957, p. 445-447.

13821 The Hypercircle in Mathematical Physics. J. L. Synge. 424 p. 1957. Cambridge University Press, London. (QC20 Sy75h)

A method for the approximate solution of boundary value problems.

13822 (German.) Industrial Heat-Exchange. **Der Industrielle Wärmeübergang.** Alfred Schack. 5th Ed. 434 p. 1957. Verlag Stahleisen, Düsseldorf, Germany. (QC320 Sch11i5)

Covers theory and basic principles, and gives solutions to many practical problems encountered in design of various types of equipment.

13823 On the Width and Energy of Domain Walls in Small Multi-Domain Particles. Henri Amar. *Journal of Applied Physics*, v. 28, June 1957, p. 732-733.

For very small particles containing only a very few domains, the characteristics of the wall are closely dependent on the size and domain configuration.

13824* Energy Absorbed by Elastic Waves During Impact. S. C. Hunter. *Journal of the Mechanics and Physics of Solids*, v. 5, no. 3, 1957, p. 162-171.

The absorption of vibrational energy in the form of elastic waves generated by a transient localized force acting normally to the free surface of a semi-infinite solid is calculated in terms of the Fourier components of the force. Result is applied to the Hertzian collision of a small body with the plane surface of a massive specimen.

13825* (French.) Patterns for the Various Types of Traps in Phosphorescent Zinc Sulfide. Thermal and Optical Release of Trapped Electrons. **Modèles pour les divers types de pièges dans le sulfure de zinc phosphorescent. Libération thermique et optique des électrons piégés.** Daniel Curie. *Journal de Physique et le Radium*, v. 18, Apr. 1957, p. 214-222.

Experimental results with ZnS and ZnS(Cu). Principle for the calculation of the energies of thermal and optical ionization of an impurity level. Pattern of the "hydrogen shaped molecule" in a crystal.

13826* (French.) The Elasticity of the Crystalline Medium. **L'élasticité du milieu cristallin. II.** Dynamics of Elastic Waves. **Dynamique des ondes élastiques.** Jean Laval. *Journal de Physique et le Radium*, v. 18, May 1957, p. 289-296.

13827* (French.) Tensorial Theory of Magnetic Rotary Power. **Théorie tensorielle du pouvoir rotatoire magnétique.** Yves Le Corre. *Journal de Physique et le Radium*, v. 18, May 1957, p. 312-317.

General linear relations suitable for the magnetic rotatory power in nonabsorbing media. Influence of symmetry upon these tensor equations, considering the magnetic anisotropy of electromagnetic wave propagation.

13828* (French.) Interaction Between Waves and Electrons, With Some Remarks on Superconductivity. **Interactions d'ondes et électrons et remarques sur la supraconductivité.** L. Brillouin. *Journal de Physique et le Radium*, v. 18, May 1957, p. 331-336.

A new factor is needed to characterize superconductors, and explain their low-temperature and magnetic behavior.

13829* (Russian.) Piezo Modulus of Displacement of Polarized Barium Titanate. **P'ezomodul' sdviga poliarizovannogo titanata bariia.** S. V. Bogdanov, B. M. Vul, and R. Ia. Razbash. *Kristallografiia*, v. 2, no. 1, 1957, p. 115-118.

Calculation of piezoelectrical characteristics.

13830* (Russian.) Dielectric and Piezoelectric Properties of Polarized $BaTiO_3$ in Various Ferroelectric Phases. **Dielektricheskie i p'ezoelektricheskie svoistva poliarizovannoi keramki $BaTiO_3$ v raznykh segnetoelektricheskikh fazakh.** L. A. Shuvalov. *Kristallografiia*, v. 2, no. 1, 1957, p. 119-129.

A formula is derived relating electrical and mechanical characteristics.

13831 Combination of Photoreceptor Responses in the Photopic Liminosity Characteristic. C. E. M. Hansel. *Nature*, v. 179, June 22, 1957, p. 1290-1291.

Photometric comparisons in which adjustments are made until two halves of a test-field appear identical involve measurement of the relative amounts of the two stimuli necessary to bring about this equivalence.

13832* On a Higher Approximation of the Critical Field Strength for an Antiferromagnetic. K. F. Niessen. *Philips Research Reports*, v. 12, June 1957, p. 259-269.

The critical magnetic field strength is derived for an antiferromagnetic with different anisotropy constants for the two sublattices, account being taken of the field-strength dependence of the parallel and perpendicular susceptibilities and a higher approximation of the anisotropy energy.

13833 Irradiation Damage in Single Crystals of Magnesium Oxide. F. P. Clarke. *Philosophical Magazine*, v. 2, ser. 8, May 1957, p. 607-627.

Effects of ultra-violet and neutron irradiation; role of impurities.

13834 A Study of the Growth of Crystals From Solution When Subjected to Local Deformation Anne P. Williams. *Philosophical Magazine*, v. 2, ser. 8, May 1957, p. 635-638.

The effect of local deformation on the growth features on crystal faces was studied on crystals of $Pb(NO_3)_2$ and potassium dihydrogen phosphate. New growth centers form at these points and these can be initiated where desired on the face and if strong enough will dominate over the existing centers of growth.

13835 Photoelastic Study of Dislocation Arrangements in Crystals. J. F. Nye, R. D. Spence, and M. T. Sprackling. *Philosophical Magazine*, v. 2, ser. 8, June 1957, p. 772-776.

The plastic deformation of single crystal bars of AgCl in tension and bending was studied.

13836 (English.) **Paramagnetic Relaxation in Iron Ammonium Alum and Diluted Iron Ammonium Alum at Very Low Temperatures.** L. C. Van der Marel, J. Van den Broek, and C. J. Gorter. *Physica*, v. 23, May 1957, p. 361-377.

13837 (English.) **A Cell-Cluster Theory for the Liquid State. III. The Harmonic Oscillator Model.** E. G. D. Cohen, J. De Boer, and Z. W. Salsburg. **IV. A Fluid of Hard Spheres.** Z. W. Salsburg, E. G. D. Cohen, B. C. Rethmeier, and J. De Boer. *Physica*, v. 23, May 1957, p. 389 + 19 pages.

Theory is applied to the case where the total intermolecular potential field can be approximated by a harmonic potential field, and also to a fluid of hard elastic spheres.

13838 Luminescence of Silver Bromoiodide Crystals. F. Moser and F. Urbach. *Physical Review*, v. 106, ser. 2, June 1, 1957, p. 852-858.

13839 Molecular Field Fluctuation Effects in Mixed Nickel-Zinc Ferrites. D. M. Grimes, S. Legvold, and Edgar F. Westrum, Jr. *Physical Review*, v. 106, ser. 2, June 1, 1957, p. 866-867.

13840 Photoconduction in KBr and KI Containing *F* Centers. Nicolas Inchauspé. *Physical Review*, v. 106, ser. 2, June 1, 1957, p. 898-903.

The product of the quantum yield and unit range was measured at 80 K over the spectral range from 2.0 to 5.8 e.v. with *F*-center concentrations between 10^{15} and 10^{17} cm.$^{-3}$.

13841 Hyperfine Structure of Positronium in Its Ground State. V. W. Hughes, S. Marder, and C. S. Wu. *Physical Review*, v. 106, ser. 2, June 1, 1957, p. 934-947.

13842 Structure of the Resonance Line of the Arc Spectrum of Barium. D. A. Jackson. *Physical Review*, v. 106, ser. 2, June 1, 1957, p. 948-952.

The line was found to have four well resolved components at 0.0, +3.8, +9.9, and +18.4 mK with apparent intensities of approximately 20:4.5:2.5:1.

13843* (English.) **Magnetic Properties of Perovskites Containing Strontium. I. Strontium-Rich Ferrites and Cobaltites.** Hiroshi Watanabe. *Physical Society of Japan, Journal*, v. 12, May 1957, p. 515-522.

Magnetic susceptibilities and electrical conductivities of (La, Sr) (Fe/Co) oxide samples sintered in vacuum or in O.

13844 Point Defects in Face-Centred Cubic Lattice. II. X-Ray Scattering Effects. H. Kanzaki. *Physics and Chemistry of Solids*, v. 2, Apr. 1957, p. 107-114.

13845 Progress in Low Temperature Physics. C. J. Gorter, editor. v. II. 480 p. 1957. North-Holland Publishing Co., Amsterdam. (QC278 G68p)

Reviews of recent research and the present status of knowledge in several fields of low temperature physics, particularly magnetism, liquid He, and superconductivity.

13846 The Band Structure of Aluminium. I. Determination From Experimental Data. II. The Convergence of the Orthogonalized Plane Wave Method. III. A Self-Consistent Calculation. V. Heine. *Royal Society, Proceedings*, v. 240, ser. A, June 11, 1957, p. 340-374.

13847* (English.) **Vibrational Band Shapes and Band Intensities.** R. A. Russell and H. W. Thompson. *Spectrochimica Acta*, v. 9, no. 2, 1957, p. 133-147.

The influence of spectrometer slit-widths upon the shapes of some vibrational absorption bands was examined.

13848 (German.) Tables for Electron Physics, Ion-Physics and Ultra-Microscopy. **Tabellen der Elektronenphysik, Ionenphysik und Übermikroskopie.** Manfred von Ardenne. v. II. 1368 p. 1956. VEB Deutscher Verlag der Wissenschaften, Berlin. (TK7855 Ar28t Over.)

Tables and graphical data on kinetic gas theory and high-vacuum engineering, plasma physics, optics and photography, electrotechnics and magnetism, H.F. and stabilized current sources, and other important constants.

13849* (German.) Clarification of Magnetic After Effect by Means of Electronic Diffusion in Ferrites. **Beitrag zur Klärung der magnetischen Nachwirkung durch Elektronendiffusion in Ferriten.** A. v. Kienlin. *Zeitschrift für Angewandte Physik*, v. 9, May 1957, p. 245-250.

Dependence between temperature and magnetic after-effects in various stoichiometric ferrites. Studies of after effect in Ni-Zn ferrites which contain only normal trivalent iron.

13850* (Russian.) Proper Frequencies and Amplitudes of Free Normal Oscillations in KCl Crystals. **Sobstvennye chastoty i amplitudy svobodnykh normal'nykh kolebanii kristalla KCl.** T. I. Kucher. *Zhurnal Eksperimental'noi i Teoreticheskoi Fiziki*, v. 32, Mar. 1957, p. 498-505.

13851* (Russian.) Calculation of the Drift Velocity of Gaseous Ions in an Electric Field. **Vychislenie skorosti dreifa ionov v elektricheskom pole v sobstvennom gaze.** V. I. Perel'. *Zhurnal Eksperimental'noi i Teoreticheskoi Fiziki*, v. 32, Mar. 1957, p. 526-533.

See also: **12933** (bent hydroquinone crystals); **13306** (optical systems); **13702** (radiation effects in KCl).

PLASTICS

13852* (Spanish.) Silicones: Production, Properties, and Applications. **Siliconas: Obtención, propiedades y aplicaciones.** Luis Diaz Martinez. *Acero y Energia*, v. 14, Mar.-Apr. 1957, p. 35-39.

Description of silicones; historical survey. Production by the Rochow, Grignard, sodium, and olefin methods. Monomers. Uses as water repellents, insulation, color stabilizers, etc.

13853 The Free Radical Initiated Polymerization of Gaseous Unsaturated Hydrocarbons. Leslie C. Landers and David H. Volman. *American Chemical Society, Journal*, v. 79, June 20, 1957, p. 2996-2999.

Methyl radicals from thermally decomposing di-*t*-butyl peroxide were found to initiate the polymerization of gaseous acetylene, 1,3-butadiene, ethylene, and propene in the temperature range 130-165 C. The rate of polymerization of each unsaturated hydrocarbon was proportional to the first power of the concentration of monomer and to the square root of the concentration of di-*t*-butyl peroxide.

13854 Preparation and Polymerization of Unsaturated Quaternary Ammonium Compounds. VIII. A Proposed Alternating Intramolecular-Intermolecular Chain Propagation. George B. Butler and Rudolph J. Angelo. *American Chemical Society, Journal*, v. 79, June 20, 1957, p. 3128-3131.

A mechanism is proposed for the polymerization of certain allyl unsaturated quaternary ammonium salts which involves an alternating intramolecular - intermolecular chain propagation leading to the formation of chains of piperidine rings. This mechanism is supported by results obtained using suitable monomers, by studies of solvent, initiator and oxygen effects and by hydrogenation evidence.

13855 The Synthesis and Identification of Block Polymers of Butadiene and Styrene. R. J. Orr and H. Leverne Williams. *American Chemical Society, Journal*, v. 79, June 20, 1957, p. 3137-3141.

A method of synthesizing polymeric dihydroperoxides in which the hydroperoxy groups are terminal was evolved. The monomers are polymerized in emulsion at 12.8 C using sufficiently large quantities of complexed iron (II) and *p*-diisopropylbenzene dihydroperoxide so that mutual termination is dominant.

13856 Reactions of Unsaturated Fatty Alcohols. III. Viscosity and Molecular Weight Studies on Some Vinyl Ether Polymers. L. E. Gast, W. J. Schneider, and H. M. Teeter. *American Oil Chemists' Society, Journal*, v. 34, June 1957, p. 307-310.

Polymers of the vinyl ethers of stearyl, soybean, and linseed fatty alcohols were examined.

13857* (German.) Polyacetylene Compounds. **Polyacetylenverbindungen. XIX.** Nucleophylic Addition to Polyene. **Nucleophile Addition and Polytine.** Ferdinand Bohlmann, Eberhard Inhoffen, and Joachim Politt. *Annalen der Chemie*, v. 604, May 1957, p. 207-213.

A nucleophylic addition can be made to polyenes having more than three conjugated bonds.

13858 The Polymerization of Methacrylonitrile at Elevated Temperatures. S. Bywater. *Canadian Journal of Chemistry*, v. 35, June 1957, p. 552-555.

Study of the kinetics of photosensitized polymerization above 100 C indicates importance of the reverse (depropagation) reaction. Heat and entropy change were calculated.

13859* (French.) Isotactic Polymers and Other Stereoisomeric Polymers. **Polymères isotactiques et autres polymères stéréoisomères.** G. Natta. *Chimie & Industrie*, v. 77, May 1957, p. 1009-1031.

Crystalline structure and the main technical properties of the crystalline isotactic polymers of α olefins, and especially of polypropylene.

13860* (Dutch.) High Frequency Welding Technique for Thermoplastics. **Hoogfrequent lastechniek voor thermoplastische kunststoffen.** A. C. van Dorp. *Bedrijf en Techniek*, v. 12, no. 279; *Electronica section*, v. 10, no. 226, May 18, 1957, p. 77-79.

Interesting new packing methods are made possible by means of a special H.F. welding apparatus for new plastics based on PVC.

13861 Plastics Sandwich Construction. G. D. Miller and H. J. Waite. *British Plastics*, v. 30, June 1957, p. 223-226.

Materials, design, and applications.

13862 The Growth of Butadiene Popcorn Polymer in the Presence of Methyl Methacrylate Monomer. Glenn H. Miller and Abolfath Khan Bakhtiar. *Canadian Journal of Chemistry*, v. 35, July 1957, p. 584-587.

The rate of growth of butadiene popcorn polymer seed in the presence of methyl methacrylate monomer vapor was found to be logarithmic with time and very sensitive to the presence of hydroquinone in the monomer. The resulting butadiene-methyl methacrylate graft polymer was homogeneous in appearance.

13863 Preparation of Some Pure Polyoxyethyleneglycol Ethers. I. B. A. Gingras and C. H. Bayley. *Canadian Journal of Chemistry*, v. 35, July 1957, p. 599-604.

The Williamson ether synthesis was applied to the preparation of polyoxyethyleneglycol mono- and di-ethers. These were obtained by reacting the mixed K salts of hexaoxyethyleneglycol with alkyl or aryl halides.

13864 The Physical Properties of Polymers in Relation to Their Chemical Structure. Geoffrey Gee. *Chemical Society, Proceedings*, Apr. 1957, p. 111-118.

Effects of intermolecular forces and chain structure on properties.

13865 Service Experience of Glass - Reinforced Plastic Tanks. *Corrosion*, v. 13, July 1957, p. 459t-460t.

Data are given to show the results of circumferential measurements made on a glass-epoxy 250-barrel oil field stock tank in both the full and the empty condition over one winter and three summers.

13866 The Polymerization of 1-Oxa-4:5-Dithio-Cycloheptane. F. S. Dainton, J. A. Davies, P. P. Manning, and S. A. Zahir. *Faraday Society, Transactions*, v. 53, June 1957, p. 813-820.

Heat of polymerization of the above equals 1.90 ± 0.1 kcal. $mole^{-1}$ at 26.95 C.

13867 Synthesis of Linear Polyethylene by a Free Radical Route at Very High Pressures. R. A. Hines, W. M. D. Bryant, A. W. Larchar, and D. C. Pease. *Industrial and Engineering Chemistry*, v. 49, July 1957, p. 1071-1074.

All linear polyethylenes of same weight-average molecular weight, however synthesized, have similar properties, if free of contamination from catalyst residues and "grease".

13868 Film Curing by Simultaneous Esterification and Olefin Polymerization. Sylvan O. Greenlee, John W. Pearce, and John Kawa. *Industrial and Engineering Chemistry*, v. 49, July 1957, p. 1085-1088.

Products having excellent resistance to water and alkali are formed during a normal varnish baking schedule.

13869 Anhydride Curing Agents for Epoxy Resins. Hans K. Weiss. *Industrial and Engineering Chemistry*, v. 49, July 1957, p. 1089-1090.

Low-melting anhydrides have clarity, light color, long pot life, ease of handling, and impart heat distortion temperatures up to 143 C.

13870 Reaction of Polyamide Resins and Epoxy Resins. Dwight E. Peerman, Wesley Tolberg, and Don E. Floyd. *Industrial and Engineering Chemistry*, v. 49, July 1957, p. 1091-1094.

Infra-red analysis gives new information on curing conditions in thermoset compositions used industrially.

13871 Epoxy Resin Esters Containing Tung Oil Fatty Acids. Leo A. Goldblatt, Lucien L. Hopper, Jr., and Donald L. Wood. *Industrial and Engineering Chemistry*, v. 49, July 1957, p. 1099-1102.

These esters possess exceptional hardness, gloss, and chemical resistance. Use of Zn resinate reduces danger of gelation, improves wetting properties and resistance to alkali. Incorporation of potentially fungicidal acids may promote mildew resistance.

13872* (Russian.) Synthesis of S-Compounds Based on Vinyl Ethers and C_2H_2. **Sintez sernistykh veshchestv na osnove prostykh vinilovykh efirov i atsetylena. XIV.** Ionic Polymerization of Vinylalkyl-Sulfides. **Ionnaia polymerizatsiia vinilakilsulfidov. XV.** Free-Radical Copolymerization of Thiovinyl Ethers With Some Unsaturated Compounds. **Svobodnoradikalnaia sovmestnaia polimerizatsiia thiovinilovykh efirov s nekotorymi nepredelnymi soedineniami.** M. F. Shostakovskii, E. N. Prilzeheava, and V. M. Karavaeva. *Izvestiia Akademii Nauk SSSR, Otdelenie Khimicheskikh Nauk*, no. 5, May 1957, p. 621 + 7 pages.

13873 Characteristics of the Polyamide-Epoxy Resin System. D. E. Floyd, D. E. Peerman, and H. Wittcoff. *Journal of Applied Chemistry*, v. 7, May 1957, p. 250-260.

Reaction mechanism; general properties of the blends; use as adhesives.

13874* Transitions in Plasticized and Unplasticized Cellulose Acetates. J. Russell and R. G. Van Kerpel. *Journal of Polymer Science*, v. 25 June 1957, p. 77-96.

Temperature dependence of specific volume, rigidity modulus, and mechanical losses of plasticized and unplasticized cellulose acetates in the temperature range −100 to +200 C.

13875* (Russian.) The Mechanical Method in Production of New Types of Polymers. **Mekhanicheskii metod polucheniia novykh tipov polimerov.** V. A. Kargin, B. M. Kovarskaia, M. S. Akutin, L. I. Golubenkova, and G. L. Slonimskii. *Khimicheskaia Promyshlennost'*, no. 2, Mar. 1957, p. 77-79.

Application of a special apparatus in production of block and combined polymers.

13876* (Russian.) A Study of the Transition of Amorphous and Crystalline Polymers From the Solid to the Fluid States on Introduction of Low Molecular Compounds. **Issledovanie perekhoda amorfnykh i kristallicheskikh polimerov iz tverdogo sostoianiia v tekuchee pri vvedenii nizkomolekuliarnykh veshchestv.** V. A. Kargin, G. L. Slonimskii, and L. Z. Rogovina. *Kolloidnyi Zhurnal*, v. 19, no. 2, 1957, p. 142-147.

13877* (Russian.) The Correlation Between the Structure of Alkylaromatic Sulfo-Acid Type Emulsifiers and the Polymerization Process of Unsaturated Compounds. **Zavisimost' mezhdu stroeniem emul'gatorov tipa alkilaromaticheskikh sul'fokislot i protsessom polimerizatsii nepredel'nykh soedinenii. IV.** Univalent Cation Salts of Di-Sec-Butylnaphthalene Sulfo-Acids. **Soli di-vtorichno-butilnaftalinsul'fokisloty s odnovalentnymi kationami.** N. P. Apukhtina and A. M. Liagalova. *Kolloidnyi Zhurnal*, v. 19, no. 2, 1957, p. 154-158.

13878* (Russian.) The Hardening of Thermoreactive Plastics. **K voprosu o mekhanizme otverzhdeniia termoreaktivnykh plastikov (pressporoshkov).** I. F. Kanavets, L. G. Batalova, and A. G. Romashova. *Kolloidnyi Zhurnal*, v. 19, no. 2, 1957, p. 204-218.

An investigation of the hardening process and certain mechanical properties by means of a plastometer and by measuring changes in shearing stress. Press powders were made of phenol-cresol-xylenol-formaldehyde resins, of melamine-formaldehyde resins, and of aminoplast.

13879* (German.) Dynamic-Elastic Behavior of Polyamides and Polyurethanes in Relation to Frequency, Temperature, and Their Moisture Content. **Über das dynamisch-elastische Verhalten von Polyamiden und Polyurethanen in Abhängigkeit von Frequenz, Temperatur und Wassergehalt.** G. W. Becker and H. Oberst. *Kolloid-Zeitschrift*, v. 152, May 1957, p. 1-8.

Dependence of dynamic-elastic behavior of various polyamides and polyurethanes on frequency, temperature, and water content was studied, as well as the relaxation process in the molecular chain links in relation to moisture content.

13880* (German.) Cold and Hot Deformation of Polyethylene. **Zur Kalt- und Warmverformung von Polyäthylen.** R. Kaiser. *Kolloid-Zeitschrift*, v. 152, May 1957, p. 8-15.

Presence of crystallites in relation to deformation.

13881* (German.) Heat Conductivity of Polyvinylchloride With or Without Plasticizer in the Temperature Range From 70 to 360 K. **Wärmeleitfähigkeit von Polyvinylchlorid mit und ohne Weichmacher im Temperaturbereich von 70 bis 360 K.** Th. Gast, K. H. Hellwege, and E. Kohlhepp. *Kolloid-Zeitschrift*, v. 152, May 1957, p. 24-31.

Description of equipment used in experiments. The obtained heat conductivity of the softest PVC was taken as a constant of the plasticizer-content function for all other synthetic materials used in the experiments.

13882* (German.) Molecular Interpretation of the External Softening of High Polymers. **Versuch einer molekularen Deutung der äusseren Weichmachung von Hochpolymeren.** Franz Würstlin. *Kolloid-Zeitschrift*, v. 152, May 1957, p. 31-36.

Relation between solvated and non-solvated plasticizer molecules and the external softening of high polymers.

13883* (German.) Investigation of High Polymer Acrylic Derivatives. **Untersuchungen an hochpolymeren acrylderivaten.** J. Schurz, H. Bayzer, and H. Stübchen. *Makromolekulare Chemie*, v. 23, nos. 2-3, 1957, p. 152-161.

The ultra-violet and infra-red spectra of several high polymer acrylics are reported. With polyacrylonitrile a significant additional absorption is found in the ultra-violet range.

13884 Selection and Design of Fluorocarbon Plastics. Malcolm W. Riley. *Materials & Methods*, v. 45, June 1957, p. 129-148.

Properties include inertness to almost all chemicals, resistance to both high and low temperatures, excellent dielectric properties, zero moisture absorption, high impact strength, and a nonstick surface with low coefficient of friction.

13885 Atomic Attack on Plastics. *Modern Plastics*, v. 34, July 1957, p. 104 + 4 pages.

Initial report of effects of atomic blast on 680 samples of plastics and plastic products.

13886 Vinyl Foam by Counter-Current Absorption. George J. Crowdes, Jr. *Modern Plastics*, v. 34, July 1957, p. 117 + 2 pages.

Absorption of pressurized CO_2 into plastisol in a packed tower yields a solution that can be stored, can be piped throughout plant, and foams on release of pressure.

13887 Effect of Radiation on Polyethylene. V. L. Lanza. *Modern Plastics*, v. 34, July 1957, p. 129 + 5 pages.

By a judicious selection of radiation dose it is possible to effect a marked increase in tensile strength with no significant loss in elongation, to convert a material of poor crack resistance to one which has complete crack resistance, to markedly improve the heat distortion of the polymer, and to improve its weathering characteristics.

13888 Application of the Superposition Principle to Data on Heat-Aging of Plastics. C. D. Doyle. *Modern Plastics*, v. 34, July 1957, p. 141 + 4 pages.

Superposition marshals the data for several aging temperatures into one master aging curve at a single reference aging temperature.

13889 Investigation of High-Speed Mechanical Transients. P. H. McDonald, Jr., Max A. Koontz, and H. S. Reichard. *North Carolina State College, Engineering School Bulletin, Department of Engineering Research, Bulletin No.* 63, Mar. 1957, 25 p. (TA21 N81b Vis.)

Design and operation of equipment for determining the dynamic stress-strain curve associated with a given impact velocity for various plastics.

13890* (German.) Thermochemical Study of the Reaction Between Phenol and Formaldehyde. **Eine thermochemische Studie der Reaktionen zwischen Phenol und Formaldehyd.** Oldřichvlk. *Plaste und Kautschuk*, v. 4, Apr. 1957, p. 127 + 3 pages.

13891 The Coloration of Plastics by Irradiation. I. S. H. Pinner and A. J. Swallow. *Plastics*, v. 22, June 1957, p. 194-195.

In many cases very little radiation is needed to produce a marked change in the color of dyed and pigmented plastics. This effect may prove particularly valuable on PVC materials. (To be continued.)

13892 Pressure Control for Injection Molding Machines. C. E. Beyer. *Plastics Technology* v. 3, June 1957, p. 459 + 5 pages.

Better molding quality can be obtained with a system of machine pressure control.

13893 Extrusion of Nylon 6. Rubert L. Hughes. *Plastics Technology*, v. 3, June 1957, p. 463 + 4 pages.

Material properties; extrusion conditions for making pipe, blown film, flat film, and sheet.

13894 Developments in Polyurethanes, Unsaturated Polyesters, Polyvinyl Chloride, and Acrylonitrile Copolymer Blends. William Cumming and D. Lorin Schoene. *Plastics Technology*, v. 3, June 1957, p. 473 + 4 pages.

A brief literature review.

13895 Epoxy Castings. B. F. T. Langsdorf. *Product Engineering*, v. 28 June 1957, p. 135-139.

Advantages of epoxies as a lower-cost alternative to metal or molded plastics for limited quantities of complex parts; how to design parts and molds.

13896* Water Absorption of Plastics at High Pressure. B. Dale and S. Wilson. *Rubber and Plastics Age*, v. 38, June 1957, p. 523 + 1 page.

13897 The Extrusion of "Teflon" 6 Tetrafluoroethylene Resin for Wire Insulation. D. N. De Young and G. R. Snelling. *Wire and Wire Products*, v. 32, June 1957, p. 644 + 7 pages.

13898* (German.) Acceleration of Emulsion Polymerization of Styrol by the Potassium Persulfate-Triethanilamine System. **Die Beschleunigung der Emulsionspolymerisation von Styrol durch das System Kaliumpersulfat-Triäthanolamin.** E. Bartholomé and H. Gerrens. *Zeitschrift für Elektrochemie*, v. 61, no. 4, 1957, p. 522-530.

Study of the acceleration process that takes place in the emulsion polymerization reaction after a small amount of triethanilamide is added to the reaction mixture.

13899* (Russian.) Polymerization of Chlorohexadienol. **Polimerizatsiia khlorgeksadienola.** A. E. Akopian and E. Kh. Khachatrian. *Zhurnal Prikladnoi Khimii*, v. 30, no. 4, Apr. 1957, p. 612-618.

Polymerization to 60 to 70% transformation leads to formation of a polymer soluble in alcohol, and further transformation leads to a gelatinous, insoluble polymer. The alcohol solutions form a strong plastic film on wood, glass, and metal.

See also: **12739** (aliphatic organo-functional siloxanes); **12926** (study of the polyvinyl alcohol-iodine system); **12947** (polymerization reactions); **12986** (vinyl copolymers); **13916** (photoelastic properties of polymers).

POLLUTION AND WASTES

13900 Catalytic Decomposition of Nitric Oxide. Charles H. Riesz, Fred L. Morritz, and Karl D. Franson. *Air Pollution Foundation, Report No.* 20, v. 2, May 1957, 22 p. (TD884 Ai71.3r Vis.)

A rapid screening method was devised to evaluate the feasibility of decomposing NO at conditions which would be practical for automotive exhaust application. Charcoal activated with K_2CO_3 was found to cause appreciable decomposition of NO.

13901* Radioactive Tracers in Sanitary Engineering. Conrad P. Straub and G. Richard Hagee. *American Water Works Association Journal*, v. 49, June 1957, p. 743-749.

Radioactive tracers were used singly or in combination with either dye or chemical tracers to define the flow time in streams, pilot plant facilities, and pasteurization equipment.

13902* Microbiological Process Report. Activity of Microorganisms in Organic Waste Disposal. I. Introduction. Nandor Porges. **II. Aerobic Processes.** Ross E. McKinney. **III. Anaerobic Decomposition of Waste Solids.** A. Joel Kaplovsky. **IV. Bio-Calculations.** W. Wesley Eckenfelder, Jr. and Nandor Porges. *Applied Microbiology*, v. 5, May 1957, p. 166-187.

13903 (French.) The Book on Water. **Livre de l'Eau. v. IV.** 335 p. 1957. Centre Belge d'Etude et de Documentation des Eaux, Liège, Belgium. (QD169.W3 C33L)

Biological conditions and self-purifying capacity of rivers; processes used by city administrations and industrial plants in the treatment of wastes and effluents.

13904 The Penetration of Irregularly-Shaped Particles Through an Airborne-Dust Elutriator. J. G. Dawes, G. K. Greenough, and J. S. Seager. *British Journal of Applied Physics*, v. 8, June 1957, p. 236-241.

A connection is established between the shape-factor distribution relating the projected-area diameters and the Stokes' diameters of particles in a dust cloud, and the penetration efficiency of a standard elutriator.

13905 Fume Exhaustion in the Plating and Allied Industries. D. J. Fishlock. *Electroplating and Metal Finishing*, v. 10, June 1957, p. 184-191.

Types of equipment; construction materials.

13906 Particulate Lead Compounds in Automobile Exhaust Gas. D. A. Hirschler, L. F. Gilbert, F. W. Lamb, and L. M. Niebylski. *Industrial and Engineering Chemistry*, v. 49, July 1957, p. 1131-1142.

An answer to why urban atmospheres retain so little Pb from the vast quantities of leaded gasoline burned daily.

13907 A Sensitive Continual Monitor for the Detection of Airborne Plutonium. Alwyn C. Lapsley. *E. I. du Pont de Nemours & Co., Savannah River Laboratory Technical Division (U. S. Atomic Energy Commission)*, DP-201, Feb. 1957, 12 p. (UF767 Un3.1dp Contin.)

Continual monitor uses the impactor principle for the preferential collection of Pu. In the presence of the average level of radon-daughter activity, it can detect an airborne concentration of 0.5 MPC of Pu within 10 min. of its appearance.

13908 Removal of Fission Products From Reactor Wastes: Laboratory Studies of Liquid-Liquid Extraction From an Acid Aluminum Nitrate Solution. Herman L. Krieger, Bernd Kahn, and Conrad P. Straub. *Oak Ridge National Laboratory (U. S. Atomic Energy Commission)*, ORNL-2297, May 1957, 34 p. (UF767 U3o Contin.)

Tributyl phosphate, di-2-ethylehexyl phosphoric acid, tridecyl phosphine oxide, tri-n-octyl amine and thenoyl trifluoroacetone were effective in extracting one or more of the Ce, Y, Nb, and Ru tracers used. Strontium was extracted to a small degree, and Cs not at all.

13909* (Polish.) Purification of Drinkable Water From Phenol Using Activated Carbon. **Oczyszczanie wody pitnej od fenolu weglem aktywnym.** Cz. Jodko and W. Mišniakiewicz. *Przemysł Chemiczny*, v. 13, Apr. 1957, p. 231-232.

A simple method of regenerating the activated carbon filter.

13910* Syndets and Waste Disposal. Ross E. McKinney. *Sewage and Industrial Wastes*, v. 29, June 1957, p. 654-666.

Nature of synthetic detergents; sewage and water treatment procedures; prevention of frothing.

13911 A Fallout Plotting Device. E. A. Schuert. *U. S. Naval Radiological Defense Laboratory, Research and Development Technical Report*, USNRDL-TR-127 NS 081-001, Nov. 1956, 19 p. (QC475 Un3.5r Contin.)

A simple method requiring no drafting equipment and suited for field use.

13912 Strontium-90 Concentration Data for Biological Materials, Soils, Waters and Air Filters. E. A. Martell. *University of Chicago (U. S. Atomic Energy Commission)*, AECU3297 (Rev.) Jan. 1957, 67 p. (UF767 U3au Contin.)

13913 A Study of Some Physical Properties of an Aerosol in Relation to Airborne Decay Products of Radon. Thomas T. Mercer. *University of Rochester (U. S. Atomic Energy Commission)*, UR-474, Mar. 1957, 115 p. (UF767 Un3.1ru Contin.)

For a NaCl aerosol having a count median diameter of about 0.08μ and a geometric standard deviation of about 1.8, a concentration of approximately 10^{-10} gm/cm^3 in a test chamber of 2,000 l. capacity was found sufficient to insure that essentially all decay product atoms were attached to aerosol particles. Experiments on determining the fraction of the decay products on particles for various conditions with respect to the aerosol favored a relationship between activity and number concentration, rather than one between activity and surface concentration.

See also: **12529** (bacterial oxidation of wastes); **12542** (effects of ionized air); **12655** (analysis of sewage and wastes); **13205** (cannery waste disposal); **13304** (size separation of aerosol particles); **13957** (treatment of papermill wastes).

RUBBER AND ELASTOMERS

13914 Chain Scission in the Oxidation of Hevea. IV. Low Molecular Weight Products From Dry Rubber. E. M. Bevilacqua. *American Chemical Society, Journal*, v. 79, June 5, 1957, p. 2915-2918.

Studies are supplemented with measurements on dry rubber at 140 C.

13915* (English.) **Some Experiments Concerning the Effect of Temperature on the Crystallinity (Orientation) in Elongated Neoprene Specimens.** P. H. Lindgren. *Arkiv för Kemi*, v. 11, no. 1, 1957, p. 57-76.

Study features the continuous recording of X-ray interferences from an elongated specimen while it is heated.

13916 The Photoelastic Properties of Cross-Linked Amorphous Polymers. III. Interpretation of Results of Polythene, Polymethylene, Natural Rubber and Gutta Percha. D. W. Saunders. *Faraday Society, Transactions*, v. 53, June 1957, p. 860-870.

Values found are compared with literature values.

13917* Mastication. V. Separation and Structural Investigation of Natural Rubber-Polymethyl Methacrylate Interpolymers Formed by Mastication. D. J. Angier and W. F. Watson. *Journal of Polymer Science*, v. 25, June 1957, p. 1-18.

13918* (Russian.) Conditions and Perspectives of the Problem of Synthesis of Basic Monomers From Which Synthetic Rubber is Produced. **Sostoianie i perspektivy razvitiia problemy sinteza osnovnykh monomerov dlia Sk.** Iu. A. Gorin. *Khimicheskaia Promyshlennost'*, no. 2, Mar. 1957, p. 65-70.

Importance of monomers in production of synthetic rubber. Divinyl as the basic monomer in the synthetic rubber industry, and its synthesis. Synthesis of isoprene, iso-butylene, and chloroprene.

13919* (Russian.) Technology of Production of Foam Rubber and Its Physical and Mechanical Properties. **Tekhnologiia polucheniia i fiziko-mekhanicheskie svoistva penopolistirola.** A. A. Moiseer and T. F. Durasova. *Khimicheskaia Promyshlennost'*, no. 3, Apr.-May 1957, p. 141-147.

13920* (Russian.) The Effect of Structure on the Chemical Activity and the Capacity for Vulcanization of Butadiene Polymers. **Vliianie struktury na khimicheskuiu aktivnost' i vulkanizatsionnuiu sposobnost' butadienovykh polimerov.** B. A. Dogadkin, A. V. Dobromyslova, F. S. Tolstukhina, and N. G. Samsonova. *Kolloidnyi Zhurnal*, v. 19, no. 2, 1957, p. 188-197.

Kinetics of the interaction of butadiene polymers containing varying amounts of the 4:1 and 2:1 structures, with perbenzoic acid, ICl, and S.

13921 Selecting Silicone Rubbers. II. Properties, Design and Fabrication. F. L. Kilbourne, Jr., A. S. Kidwell, and T. S. Moroney. *Materials & Methods*, v. 45, June 1957, p. 114-119.

Types available, and how design properties are affected by temperature and fluids.

13922* (German.) Foamed Rubber Based on Natural Cell Rubber. **Schaumstoffe auf Kautschukbasis.** G. Saffran. *Plaste und Kautschuk*, v. 4 May 1957, p. 184-190.

Manufacture, structure, and practical applications of foamed rubber.

13923* (Russian.) Measurement of Mechanical and Dynamic Characteristics of Rubber. **Izmerenie mekhanicheskikh dinamicheskikh kharakteristik rezin.** V. P. Volodin and E. V. Kuvshinskii. *Pribory i Tekhnika Eksperimenta*, no. 2, Mar.-Apr. 1957, p. 94-98.

Description of equipment for determining by three independent methods the dynamic modulus of elasticity and the angle of mechanical loss in rubber under conditions of uniaxial deformation.

13924* (French.) Graft Polymers and Block Polymers From Natural Rubber. **Copolymères greffés et séquencés obtenus à partir du caoutchouc naturél.** P. W. Allen and D. Phil. *Revue Général du Caoutchouc*, v. 34, Apr. 1957, p. 363-365.

In one method, polymerization is started by chemical means, such as the decomposition of a peroxide. In the second method, rubber and vinyl polymer mastication breaks up the molecules into free radicals.

13925* (English.) **A "Reversion" Method for Reclaiming Silicone Elastomer Scraps.** René Riolfo. *Revue Générale du Caoutchouc*, v. 34, Apr. 1957, p. 393-394.

After heat treatment in the presence of a limited quantity of air, the elastomer scraps are easily rolled into a smooth homogeneous sheet.

13926 Compounding Rubbers for Resistance to Silicate-Ester Fluids. II. Nitrile, Vinyl Pyridine, Butyl and Acrylate Polymers. W. J. Mueller and R. A. Clark. *Rubber Age*, v. 81, June 1957, p. 447-459.

In attempts to develop a composition which would resist degradation when aged for periods up to 500 hr. at 400 F in silicate-ester hydraulic fluids, best results were obtained with BA-12 stocks. Tensile strength was low, but stocks did not harden or crack due to aging. Philblack A or Hi-Sil were the best fillers, and the best compositions were vulcanized with a mixture of sulfur, tetramethythiuram disulfide and triethylene-tetramine.

13927 Recent Advances in the Rubber Industry. J. A. Smithson. *Rubber Journal*, v. 132, June 15, 1957, p. 780 + 4 pages.

Synthetic and natural rubbers; tire fabrics; carbon black; automation; prevention of ozone cracking are reviewed.

13928* New Synthetic Elastomers. G. Natta. *Rubber and Plastics Age*, v. 38, June 1957, p. 495 + 5 pages.

Describes a new polymerization process for obtaining very high mol. wt., and substantially linear, macromolecules, and for isolating, in the case of diolefines and alpha-olefines, new crystalline and amorphous stereoisomers.

13929* Automotive Engineering With Urethane Foams. R. H. Walsh. *Rubber World*, v. 136, June 1957, p. 386-390.

Means have been developed for providing urethane foam with load deflection characteristics, hysteresis properties, freedom from strain decay, resilience, and aging characteristics similar to those for natural rubber foam.

13930* Improved Sectioning Technique for Electron Microscopy of Carbon Black Stocks. M. M. Chappuis and L. S. Robblee. *Rubber World*, v. 136, June 1957, p. 391 + 2 pages.

Sample is frozen to the desired hardness with dry ice in a special sample holder-freezing chamber, and sections approximately 0.5μ thick are cut with a rotary microtome having a special feed.

See also: **12993** (Hypalong coatings).

SPACE HEATING AND CONDITIONING

13931* Design of Multiple Gas Vents. Richard L. Stone. *Air Conditioning, Heating and Ventilating*, v. 54, July 1957, p. 75-85.

Tables and methods of procedure to follow in gas vent design; installation drawings.

13932* Problems in Cooling With Gas. Rex T. Ellington. *Air Conditioning, Heating, and Ventilation*, v. 54, July 1957, p. 88-91.

Research on absorption cycles and the properties of absorbent refrigerant combinations.

13933* Load and Economic Aspects of the Residential Heat Pump on Electric Utility Systems. Constantine W. Bary. *Applications and Industry*, no. 30, May 1957, p. 49-54.

Relative costs and load characteristics of three types of residential heat-pump systems.

13934* Single-Phase Versus 3-Phase Service for Residential Air Conditioning. A. S. Anderson and Chase Hutchinson. *Applications and Industry*, no. 30, May 1957, p. 61-68.

The single-phase 120/240-volt 3-wire system and the three-phase 120/240-volt 4-wire delta system are compared.

13935 Air-Conditioning in the Baking Industries. E. A. Farrand. *Chemistry & Industry*, no. 21, May 25, 1957, p. 640-644.

Covers water relations in the baking industries, especially for break, and discusses the design and function of a modern bread cooler.

13936* The ABC's of the Thermostatic Expansion Valve. John A. Schenk. *Commercial Refrigeration & Air Conditioning*, v. 14, June 1957, p. 49 + 7 pages.

13937 Design and Performance of a Portable Infiltration Meter. Carl W. Coblentz and Paul R. Achenbach. *Heating, Piping & Air Conditioning*, v. 29, July 1957, p. 155-158.

Infiltration meter was designed and constructed for measuring the concentration of a tracer gas in air employing natural convection of the gas mixture through the sensing elements.

13938 Measurement of Infiltration in Two Residences. II. Comparison of Variables Affecting Infiltration. D. R. Bahnfleth, T. D. Moseley, and W. S. Harris. *Heating, Piping & Air Conditioning*, v. 29, July 1957, p. 159-165.

Infiltration rates were measured by means of the helium tracer gas method.

13939* Regulation of Refrigerating Effect. J. J. Kowalczewski. *Modern Refrigeration*, v. 60, June 1957, p. 251 + 3 pages.

The refrigerating effect of a positive displacement compressor is regulated in accordance with demand by varying the flow of refrigerant through the evaporator at approximately constant temperature and pressure of evaporation and at constant superheat. (To be continued.)

13940 (French and English.) Ninth International Congress of Refrigeration. **IX Congrès International Du-Froid.** Sections individually paged. 1955. Paris. (TP490 In8p)

Seven volumes report proceeding of the ten commissions and plenary sessions held in Paris, Aug.-Sept. 1955. Papers cover a variety of topics such as thermal properties of materials, construction and operation of machinery; refrigerated transport; and applications of refrigeration to foodstuffs.

13941* Centrifugal Compressor Refrigeration for Aircraft. Everett P. Palmatier. *Refrigerating Engineering*, v. 65, June 1957, p. 39 + 6 pages.

Compressed air bled from the turbine engine compressor section provides a simple, light-weight drive force.

13942* Heat Transfer Rates From Heated Horizontal Tubes to Trichloromonofluoromethane. Merl Baker and J. T. Miller. *Refrigerating Engineering*, v. 65, June 1957, p. 43 + 6 pages.

13943* (Czech.) The Enthalpy of Outer Air as One of the Quantities to be Considered in Computing Air Conditioning Installations. **Entalpie venkovního vzduchu při výpočtu klimatisačních zařízení.** L. Oppl. *Strojírenství*, v. 7, May 1957, p. 346-348.

13944 Natural Air Flow Around Buildings. Benjamin H. Evans. *Texas Engineering Experiment Station, Research Report No.* 59, Mar. 1957, 15 p. (TA21 T31.2r Vis.)

Some basic facts about the movement of air around simple, single building shapes.

TEXTILES, FIBERS, LEATHER, AND PAPER

13945* Evaluation of Whitening Efficiency of Fluorescent Whitening Agents. Eugene Allen. *American Dyestuff Reporter*, v. 46, June 17, 1957, p. 425-432.

13946 Some Graphical Aids to Quantitative Reflectance Spectrophotometry of Dyeings. Albert Darbey. *American Dyestuff Reporter*, v. 46, July 1, 1957, p. 465-471.

Describes procedures based on K/S values of reflectance which it is believed will be of assistance to quantitative reflectance spectrophotometry of dyeings. In some cases the graphs indicate the percentage of dyes directly.

13947 The Hemicelluloses Present in Aspen Wood *(Populus tremuloides)*. III. The Constitution of Pentosan and Hexosan Fractions. J. K. N. Jones, E. Merler, and Louis E. Wise. *Canadian Journal of Chemistry*, v. 35, July 1957, p. 634-645.

13948 The Location and Distribution of Substituents in a Purified Hydroxyethyl Cellulose. H. H. Brownell and C. B. Purves. *Canadian Journal of Chemistry*, v. 35, July 1957, p. 677-688.

A purified hydroxyethylcellulose of molar substitution 1.33 was completely hydrolyzed in acid, and paper chromatography of the neutral hydrolyzate separated glucose, the three possible hydroxyethyl glucoses, the three di(hydroxyethyl) derivatives, and 2,3,6-tri-*O*-hydroxyethyl glucose.

13949 A Study of Sulphate in Nitrocellulose Using $S^{35}O_4^=$ as Tracer. A. G. Brickness, L. W. Trevoy, and J. W. T. Spinks. *Canadian Journal of Chemistry*, v. 35, July 1957, p. 704-714.

$S^{35}O_4^=$ was used to show that the residual S in nitrocellulose is not held by adsorption on the surface, as sulfate. Evidence

supports the view that the S which is not removed by washing after nitration and subsequent stabilization is present within the fibrous structure.

13950 Proceedings of the Third Northeastern Wood Preservation Conference. *Northeastern Wood Utilization Council, Bulletin No.* 45, Apr. 1957, 150 p. (TA419 N81w Vis.)

Includes papers on mechanisms of toxic action, insects in wood deterioration, and physical and chemical changes associated with wood decay.

13951 The Paper Year Book 1957. 571 p. 1957. Davidson Publishing Co., New York. (TS1172 P19 Vis.)

Basic information on fine papers and printing papers, wrapping papers and paper products, non-paper products, military and government packaging, paper customers, and manufacturers.

13952 Problems and Potential Uses of Photo-Mensurational Techniques for Estimation of Volume of Some Immature Stands of Douglas Fir and Western Hemlock. J. Harry G. Smith. *Photogrammetric Engineering*, v. 23, June 1957, p. 595-599.

13953* The Rheology of Cooked Wood. III. Effect of Mild Delignifying Agents. J. E. Stone and Otto Kallmes. *Pulp and Paper Magazine of Canada*, v. 58, June 1957, p. 191-196.

At a given yield, sodium chlorite-treated wood was considerably stronger and stiffer than a neutral sulfite treated specimen, even though much more lignin had been removed in the former case. Strength of wood dropped off very rapidly as material was dissolved by the neutral sulfite liquor, being one-half the original strength at 98% yield.

13954* Sulphite Pulping. A Fundamental Investigation of the Influence of Liquor Composition and Temperature on the Rate of Solution of Wood Material. W. Q. Yean, J. H. Ross, and K. E. Vroom. *Pulp and Paper Magazine of Canada*, v. 58, June 1957, p. 197-210.

13955* Short Wavelength Absorption of Various Lignins and Related Substances. III. The Flow-Microcuvette for Continuous Measurement of Lignin Concentration in Sulphite Cooking Liquors. T. N. Kleinert and C. S. Joyce. *Pulp and Paper Magazine of Canada*, v. 58, June 1957, p. 215-219.

The 2050 A absorption readings of the liquor are a true measure of the delignification and are not influenced noticeably by the carbohydrate degradation products present.

13956 (German.) Characterization of Paper Pulp. **Wie konnen Zellstoffe charakterisiert werden.** Von M. Rutishauser. *Schweizer Archiv für Angewandte Wissenschaft und Technik*, v. 23, May 1957, p. 137-145.

Description of chemical, physical, and micro-optical methods. By using a combination of these three methods, many problems can be solved in utilization of paper pulp.

13957* Stream Improvement Program for a Paper Mill. John K. Sullins. *Sewage and Industrial Wastes*, v. 29, June 1957, p. 681-686.

Waste control measures include installation of lime kiln and elimination of black ash char; pilot studies with an activated sludge plant.

13958 Shirley Institute Memoirs. v. XXIX. 305 p. 1956. Shirley Institute, Manchester. (TS1300 Sh66m Vis.)

Papers deal with 21 subjects relating to textiles, including properties and analysis.

13959 Periodate Oxidation of Water-Soluble Methylcellulose and Its Constituent Methylglucoses. G. C. Gibbons. Paper from "Shirley Institute Memoirs". v. XXIX. p. 95-113. 1956. (TS1300 Sh66m Vis.)

Three distinct types of reaction take place when methylcellulose is oxidized by sodium metaperiodate. These are: oxidation of glycol groups, a reaction causing a decrease in solution viscosity, and further reactions leading to a high degree of oxidation of the methylcellulose.

13960* A Study of the Mechanism of Fatty Spue Formation. II. R. G. Mitton and K. G. A. Pankhurst. *Society of Leather Trades' Chemists, Journal*, v. 41, May 1957, p. 161-183.

The presence of dyes, mordants, and detergents has a marked influence on the formation of fatty spue, as well as such physical factors as the thermal history of the leather, the presence of crystallization promoters (seed crystals), and mechanical action.

13961* (English.) **Fractionation of High Polymers. I. Wood Cellulose—Improved Stability and Resolution Through Preextraction of Nitrated Cellulose Fibers.** B. G. Rånby, O. W. Woltersdorf, and O. A. Battista. *Svensk Papperstidning*, v. 60, May 31, 1957, p. 373-378.

13962* Semichemical Pulping of Hardwoods With Sodium Sulphite and Sodium Bisulphite. III. R. M. Husband. *Tappi*, v. 40, June 1957, p. 412-419.

Sodium bisulphite semichemical pulps of good quality at 70% yield can be prepared from white birch wood digested at 180 C for 15 or fewer minutes. Pulp brightness values increase as the concentration of bisulphite ions unconsumed at the conclusion of cooking increases.

13963* Oxidation Potential Control of Pulp Chlorination. Continuous Automatic Control of Chlorine Addition in the First Stage of Bleaching With Oxidation Potential. George W. Seymour. *Tappi*, v. 40, June 1957, p. 426-428.

13964* Influence of Cellulose Properties on Acetylation Behavior. George A. Richter. *Tappi*, v. 40, June 1957, p. 429-441.

Covers behavior of the cellulose in the pre-swelling and depolymerization stages of the acetylation sequence, rate of acetylation, filter performance, color, solution haze, ester strength, and false viscosity.

13965* Hemicellulose and Lignin Contents of Straw Pulp. Influence on Some Paper-Technical Properties. F. M. Muller. *Tappi*, v. 40, June 1957, p. 470-474.

13966* The Use of a Triazone Resin for Producing Water-Resistant Starch-Clay Coatings. R. J. O'Brien. *Tappi*, v. 40, June 1957, p. 485-487.

These coatings for paper are completely insoluble after being dried at 220 F. for 1 min.

13967 The Water-Repellency of Fabrics: Some Differences Between the Bundesmann and Drop Penetration Tests on Union Gaberdines. S. L. Anderson, W. Guy, and G. E. Settle. *Textile Institute, Journal (Proceedings)*, v. 48, May 1957, p. P330-P336.

The Bundesmann test gave greater discrimination between the fabrics.

13968 Some Statistical Observations on the Estimation of Fibre Strength. Ian G. Cumming. *Textile Institute, Journal (Transactions)*, v. 48, May 1957, p. T143-T153.

Considers the error likely to arise when the mean strength of a lot of fiber is calculated from the means of fineness and mean breaking load instead of from the individual fiber strength.

13969* Some Thermal Properties of Fabrics. I. The Effect of Fiber Arrangement. Herman Bogaty, Norman R. S. Hollies, and Milton Harris. *Textile Research Journal*, v. 27, June 1957, p. 445-449.

Fabric insulation is determined by arrangement of fibers as well as by the thickness of the fabric.

13970* The Interference Microscope in Fiber Research. I. Initial Studies on Rayon, Cotton, Wool, and Synthetic Fibers. A. N. J. Heyn. *Textile Research Journal*, v. 27, June 1957, p. 449-458 + 1 plate.

13971* The Effect of Processing on Cotton Fiber Properties. L. Rebenfeld. *Textile Research Journal*, v. 27, June 1957, p. 473-479.

13972 The Deterioration of Redwood Cooling Tower Lumber. F. B. Waldrop, J. R. Day, and H. T. Kite. *Union Carbide Nuclear Company (U. S. Atomic Energy Commission)*, Y-1156, June 1957, 38 p. (UF767 Un3.1y Contin.)

The available literature concerning chemical and microbiological deterioration is discussed along with an investigation of wood from several Oak Ridge Towers.

See also: **12823** (formazan dyes); **13277** (coated papers for printing).

WELDING AND JOINING

13973* (Russian.) Cold-Roll Welding Under Pressure. **Rolikovaia kholodnaia svarka davleniem.** Iu. D. Pervitskii. *Avtomaticheskaia Svarka*, v. 10, Mar.-Apr. 1957, p. 61-65.

Experimental data on cold pressure welding of Al and its alloys.

13974 Development of Methods for Sealing Ends of PWR Fuel Rods. J. J. Vagi and D. C. Martin. *Battelle Memorial Institute (U. S. Atomic Energy Commission)*, BMI-942, Aug. 1954, 30 p. (UF767 U3b Contin.)

Resistance upset welding was the most promising method for end capping the PWR reference fuel element.

13975* A Japanese Process for CO_2-Shielded Arc Welding of Steel. H. Sekiguchi and I. Masumoto. *British Welding Journal*, v. 4, May 1957, p. 205-212.

High-quality welds in steel can be made by metal-arc welding using CO_2 or a CO_2-O mixture as shielding gas, and bare wire electrodes containing suitable quantities of deoxidants.

13976 Localized Analysis of Welds in High-Alloy Steels and Hot-Strength Alloys. A. G. Komarovskii. *Henry Brutcher Translation No.* 3885, 3 p. (From *Izvestiia Akademii Nauk SSSR, Ser. Fiz.*, v. 19, no. 2, 1955, p. 152-153.) Henry Brutcher, Altadena, Calif.

Describes a special generator for localized spectrochemical analysis.

13977* (French.) On a Problem of Metal Assembly From Lamellar Elements. **Sur un problème d'assemblage de métaux à partir d'éléments lamellaires.** J.-Ch. Viénot. *Chimie & Industrie*, v. 77, May 1957, p. 1038-1042.

The most interesting type of bond between the elements is obtained by "fusion" of metallic films deposited electrolytically upon each of the surfaces to be assembled.

13978 A Theory of Adhesive Scarf Joints. J. L. Lubkin. *Journal of Applied Mechanics*, v. 24, June 1957, p. 255-260.

Conditions under which a wide or narrow adhesive scarf joint can have uniformly distributed adhesive stresses. Formulas for these stresses.

13979 Automatic Spotwelding of Aluminum. *Light Metal Age*, v. 15, June 1957, p. 10-12.

Pushbutton controlled positioning tables speed feeding of Al skins.

13980* (Dutch.) A Survey of Developments in Joining of Al Sheet at Low Temperatures. **Een overzicht van de ontwikkelingen in het verbinden van aluminiumplaat bij lage temperaturen.** A. van't Hoen. *Metalen*, v. 12, May 31, 1957, p. 197-199.

A study of soldering of thin Al plates; remedies against corrosion between the solder and the basic metal; elimination of the oxide film on Al.

13981 Adhesive Bonding of Light Metals. A. E. Williams. *Metal Industry*, v. 90, May 31, 1957, p. 457-460.

Techniques; joint design and efficiency; sandwich construction; testing.

13982* (German.) Present Conditions in Welding With High Capacity Electrodes. **Der derzeitige Stand des Schweissens mit Hochleistungselektroden.** Herbert Neumann. *Oerlikon Schweissmitteilungen*, v. 15, no. 27, 1957, p. 8-22.

Reviews trends in increase in use of high capacity electrodes; objections against their use. Stepwise program for changing from contact to high capacity electrodes. Measure of attainments in high capacity welding through comparison with the common commercial practice.

13983* (German.) Knowledge Obtained in Construction of Welded Pipe-Lines for Gases and Liquids, Especially Petroleum Pipe-Lines. **Erfahrungen beim Bau geschweisster Fernleitungen für Gase und Flüssigkeiten unter besonderer Berücksichtigung von Mineralöl-Fernleitungen.** Fritz Küllmer. *Oerlikon Schweissmitteilungen*, v. 15, no. 27, 1957, p. 23-30.

Experience in construction of pipe-lines for gases and liquids. Description of welding process, insulation of welding seam, and methods of checking the welded joints. Economic data.

13984 Soldering the "Impossible". C. Fred Gurnham. *Products Finishing*, v. 21, July 1957, p. 50 + 5 p.

Solder joining of the uncommon metals and some non-metals by dressing the joint with a Wood's metal loaded grinding bit.

13985* (German.) Consideration of Metallurgical Problems in Connection With the Development of New Welding Electrodes. Examples of Successful Applications of Such Electrodes. Future Trends. **Einiges über die Metallurgie neuer Schweisselektroden-Entwicklungen. Beispiel für den erfolgreichen Einsatz der Elektroden. Zukünftige Entwicklung.** K. L. Zeyen. *Schweissen und Schneiden*, v. 9, May 1957, p. 186-193.

Range of applications and economy of electric welding processes. New developments and present position of welding electrode metallurgy. Titanium dioxide electrodes; electrodes with acid coatings. Basic, high performance, and deep penetration electrodes.

13986* (German.) Maintenance and Repair of Parts and Components by Means of Welding. **Instandsetzen und Ausbessern von Werkstücken und Maschinenteilen durch Schweissen.** Herbert Neumann. *Schweissen und Schneiden*, v. 9, May 1957, p. 194-200.

Welding of joints for locomotive and ship boilers. Welding, surfacing, and flash-butt welding of drive and brake components, wheels, couplings, and pipe. Applications of various types of electrodes. Welding of copper, Kuprodur, and bronze. Repair of castings by electric-arc and oxy-acetylene welding.

13987 How to Avoid Trouble With Stainless Welds. George E. Linnert. *Steel*, v. 141, July 1, 1957, p. 70-72.

Damaging effects of contamination, especially from Zn and S.

13988 How to Weld Molybdenum. R. R. Freeman and J. Z. Briggs. *Steel*, v. 141, July 8, 1957, p. 101-102.

Technique to avoid oxidation at welding temperatures is described.

13989* (Russian.) The Effect of Certain Alloying Elements on Chemical Heterogeneity and Mechanical Properties of Weld Seams. **Vliianie nekotorykh legiruiushchikh elementov na khimicheskuiu neodnorodnost' i mekhanicheskie svoistva svarnykh shvov.** A. A. Rossoshinskii and B. S. Kasatkiu. *Svarochnoe Proizvodstvo*, no. 5, May 1957, p. 1-6.

Weld seams are chemically heterogeneous. Increasing the cooling rate of the seams contributes to a decrease in dendrites and an increase in heterogeneity along the layer of crystallization. The chemical heterogeneity of low carbon seams is not great. Nickel, Cr, Mn, and Si affect the development of a seam's chemical heterogeneity. More than 2% Ni lowers the mechanical properties of seam metal. As a result of the chemical heterogeneity caused by Cr, seams containing more than 1% Cr have lower plasticity and resilience.

13990* Bonding Ceramic Tool Tips to Steel Shanks. H. J. Siekmann. *Tool Engineer*, v. 39, July 1957, p. 101-104.

Epoxy cements are excellent bonding agents for this purpose.

13991* Welding the Dounreay Sphere for the U. K. Atomic Energy Authority. J. A. Forrest. *Welder*, v. 26, Apr.-June 1957, p. 41-47.

A description of the design and erection processes involved in building the reactor vessel.

13992 Filler Metals for Joining. Orville T. Barnett. *Welding Engineer*, v. 42, July 1957, p. 46 + 3 pages.

Data on the 300, 400, and 500 series of filler metals described by two AWS-ASTM specifications.

13993 Recent Developments in Magnetic-Force Welding. E. J. Funk. *Welding Journal*, v. 36, June 1957, p. 576-582.

Magnetic-force equipment is described as having the ability to accurately produce and reproduce certain combinations of heat, time, and pressure which are not obtainable with conventional resistance-welding equipment.

13994 Gas-Shielded Metal-Arc Welding of High-Pressure Valves. Fred R. Zacheus. *Welding Journal*, v. 36, June 1957, p. 593-596.

Inert-gas process is ideal for improving weld quality and producing the desired cost reduction of the product.

13995 Time-Temperature Effect on Properties of Weld Heat-Affected Zone in Type 347 Stainless Steel. E. F. Nippes, B. Schaaf, W. L. Fleischmann, and R. L. Mehan. *Welding Journal*, v. 36, June 1957, p. 265s-270s.

Mechanical properties of Type 347 weld heat-affected zones are not impaired by high-temperature heat treatments. Corrosion resistance in HNO_3, however, is time-temperature dependent.

13996 Ductility of Tungsten-Arc Welds in Molybdenum. N. E. Weare, R. E. Monroe, and D. C. Martin. *Welding Journal*, v. 36, June 1957, p. 291s-300s.

Good bend ductility at 25 and 75 C was found for welds made using the best procedures established for dry-box and conventional welding. A standard shielding cup and a leading-trailing shield unit produced the best welds made in air to date. A significant difference in bend ductility was found between welds made in different heats of arc-cast carbon-deoxidized Mo of about the same carbon content.

13997 Effects of Nitrogen on the Soundness and Ductility of Welds in Molybdenum. W. N. Platte. *Welding Journal*, v. 36, June 1957, p. 301s-306s.

Nitrogen does not cause weld porosity or hot cracking but is detrimental to low-temperature ductility.

13998 Research on Room Temperature Curing Structural Adhesives for Metals. Roy H. Moult and William E. St. Clair. *Wright Air Development Center, Materials Laboratory, WADC Technical Report* 56-410, Apr. 1957, 52 p. (TL507 Un3.18w Vis.)

A study on the formulation of room temperature, low-pressure cured metal-to-metal adhesives, based on the use of glycidyl ethers of resorcinol resins. Preferred formulations were those with pot lives of 1 to 3 hrs. as obtained by use of solid diamines as curing agents.

13999 Development of High-Strength Filler Wires for Welding SAE 4130, 4140, and 4340 Steels. Herbert W. Mishler and Raeman P. Sopher. *Wright Air Development Center, Materials Laboratory, WADC Technical Report* 56-550, Apr. 1957, 69 p. (TL507 Un3.18w Vis.)

See also: **12601** (ceramic welding nozzles); **13361** (explosion-bulge-testing of steel welds); **13431** (brazing of Zr alloys); **13509** (heat treatment of Mg welds); **13529** (fatigue testing of butt welds); **13635** (structure of stainless steel welds); **13636** (properties of stainless steel welds); **13640** (metallography of welds); **13691** (inspection of welded pipe); **13873** (resin adhesives).

MISCELLANEOUS

14000 American Civil Engineering Practice. Robert W. Abbett, editor. v. III. Sections individually paged. 1957. John Wiley & Sons, New York. (TA145 Ab19a)

A comprehensive reference source dealing with masonry, reinforced concrete, steel, and timber structures.

14001 American Housing and Its Use. The Demand for Shelter Space. Louis Winnick. 143 p. 1957. John Wiley & Sons, New York. (HD7293 W73a)

Discussion of trends in household size and composition, income, prices, and rents in relation to the number of rooms desired by families, based on U. S. census data.

14002 Approximate Operational Calculus in Chemical Engineering. Stuart W. Churchill. *A.I.Ch.E. Journal*, v. 3, June 1957, p. 289-293.

Approximations are suggested to extend the usefulness of operational calculus in solving boundary-value problems. The use of computing machines is also considered.

14003* The Transmission of Detonation From Charges of TNT to LFB-Dynamite, Nitrolit or TNT. Algot Persson. *Applied Scientific Research*, v. 6, sec. A, nos. 5-6, 1957, p. 365-371.

The transmission of detonation was studied with a rotating mirror camera.

14004* Effect of Inclination Angles on Capacity of Belt Conveyors. *Flow*, v. 12, July 1957, p. 62 + 7 pages.

Delivery rates at 95%, or more, of ideal capacity can be achieved with good design.

14005* (Czech.) Application of the Analysis of Variance for Evaluating Experimental Results. **Použití analysy rozptylu k rozboru výsledků pokusů.** Miroslav Knotek and J. Janko. *Hutnické Listy*, v. 12, May 1957, p. 423-430.

Examples from metallurgical research are presented.

14006 The Law Relating to Petroleum Mixtures, Acetylene, Calcium Carbide, and to the Transport of Carbon Bisulphide and Certain Compressed Gases. Hugh E. Watts. 179 p. 1956. Charles Griffin & Co., London. (T55 W34L)

Properties and uses; storage regulations; details of accidents in Great Britain during the years 1920-1949.

14007 (German.) Max Planck Institute for Metal Research. **Max-Planck-Institut für Eisenforschung.** Ten Years of Iron Research 1945-1954. **10 Jahre Eisenforschung 1945-1954.** Franz Wever. 145 p. 1956. Verlag Stahleisen, Düsseldorf. (TN704.G3 M45z)

Research activities of the Max Planck Institute in the field of metals from 1945-1954 are described. Includes a chronological and alphabetical listing of reports published by the institute during this period.

14008 (French.) Mining Union of Upper Katanga. Lower-Congo and Katanga Railway Company. International Congo Lumbering and Mining Corporation. 1906-1956. **Union Minière du Haut-Katanga. Compagnie du chemin de fer du bas-Congo au Katanga. Société Internationale. Forestière et Minière du Congo. 1906-1956.** 72 p. 1956. Union Minière du Haut-Katanga, Elisabethville, Belgian Congo. (Q91 So89 Over.)

A memorial book covering the celebrations that took place in Katanga and Kasai, in July and Aug. 1956 for the Fiftieth Anniversary of these Belgian companies, founded respectively Oct. 28, Oct. 31, and Nov. 6, 1906.

14009 Department of Defense Program on Materials Research and Development. *National Academy of Sciences, National Research Council, Materials Advisory Board Report* No. MAB-117-M, v. 1-2, Mar. 1957, 20 and 129 p. (TN1 N21.5r Contin.)

Includes recommendations for improvement in content and organization of the technical program, along with specific recommendations with respect to individual materials for new work or alterations in emphasis on old projects.

14010 Potential Future Use of Photogrammetry in Highway Engineering. William C. Cude. *Photogrammetric Engineering*, v. 23, June 1957, p. 558-563.

Aerial photography and photogrammetric methods are used to reduce cost and time in planning and control of highway programs.

14011 Using New Methods in Highway Location. Paul Roberts. *Photogrammetric Engineering*, v. 23, June 1957, p. 563-569.

Photogrammetry and airphoto analysis combined with computers can and will become the most important tools which the highway engineer has at his disposal for route selection.

14012 General Review of Analytical Aerotriangulation. Arthur J. McNair. *Photogrammetric Engineering*, v. 23, June 1957, p. 573-582.

High-speed electronic calculators have made it possible to solve the problems of ground control point triangulation from photographic measurements.

14013 Proceedings of Symposia in Applied Mathematics. v. VII. Applied Probability. L. A. MacColl, editor. 104 p. 1957. McGraw-Hill, New York. (QA1 Sy68p)

Nine papers dealing with theory of diffusion, theory of turbulence, and probability in classical and modern physics.